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EUROPE REPORT

SCIENCE AND TECHNOLOGY

WEST EUROPE

/9986

WEST EUROPE/ADVANCED MATERIALS

BRIEFS

EUROPEAN ASSOCIATION ESTABLISHED--The European Commercial Association of Suppliers of Advanced Composite Materials (ETAC) was established by 80 companies including major fiber and resin manufacturers, as well as fiber processors and manufacturers of preimpregnated materials. ETAC is based in Zurich and its objective is to promote the industrial development of advanced composites. The principal founding companies include: Dow Chemical, Toray, Hysol Graphil, BASF, Du Pont de Nemours, Hercules.... [Text] [Paris L'USINE NOUVELLE in French 14-21 Aug 86 p 21] 25026/12781

CSO: 3698/A217

WEST EUROPE/AEROSPACE

NORWAY, AUSTRIA TO BECOME FULL MEMBERS OF ESA

Duesseldorf VDI NACHRICHTEN in German 26 Sep 86 p 42

[Article by Wolfgang Engelhardt: "Europe's Astronauts Receive Reinforcement From Scandinavia: Norway in the ESA--As of 1987 the European Astronautical Organization Will Include a Total of 13 Member States"]

[Text] Oslo, 26 Sep (VDI-N)--Although at the moment American and also West European astronautics is in crisis yet preparations continue at full intensity for future satellite projects. ESA, the European space authority, is working intensively on a new ignition mechanism for the third stage of the Ariane transport rocket so that the latter can once again be launched successfully by January 1987. Starting early next year the ESA will in addition have two new countries as members. Norway and Austria will be the 12th and 13th countries to enter the European space organization.

Norway and Austria are countries which are by no means unknown to the ESA. Since 1981 they have been present in that organization as observers. Both countries can contribute considerable technical and scientific potential in the development of satellites and probes, rockets and space stations, and on the other hand they themselves hope to gain from ESA membership significant stimulus for their own economy and industrial development. Now the most important enterprises of the Scandinavian country have come forward in Norway, hoping that full membership of their country in the ESA will yield new innovative impulses.

Necessarily, the nature of Norway's involvement in space depends particularly upon the geographic features of this country with its 2,650-km-long coastline. It also depends upon the traditional involvement of about 4.1 million people in navigation, in fisheries, and recently for petroleum prospecting and development far out in the rough North Sea. In these vital areas of interest Norway even today has already been profiting through cooperative contracts with European and international space programs. One need only recall global communication via communications satellites or in emergencies via the Sarsat/Comsat rescue system which by means of automatic signal buoys give the position of a distressed ship even in the most severe weather.

For a long time now Norway has held 14 percent of shares in Inmarsat, an international company engaged in the development and application of communications satellites in international navigation. Together with Sweden and Denmark

Norway is working on the Tele-X satellite project which will substantially improve communications transmission within Scandinavia.

A further important area of interest in the case of Norway is terrestrial exploration by means of specially developed satellites, particularly the regular surveillance of large areas of water, glaciers, and ice fields. Initial trials using American satellites in the visible, infrared, and microwave parts of the spectrum have been very successful.

Radar radiation is especially suitable in this connection because it is capable of recording the character of the terrestrial surface even under cloudy conditions and in darkness--a very important aspect of the matter for a country such as Norway whose territory is situated so far in the north. For this reason this small country will follow its entrance into the ESA with increased participation in the use of the first European terrestrial exploration satellite ERS-1 which is to be launched in 1989 and will regularly scan the surface of our planet with its large radar antennas. The signals received by its microwave sensor at every time of day and under all weather conditions will be immediately evaluated in the ground stations with the aid of very efficient computers and will supply information, for example, about the height, frequency, and direction of waves on the high seas or about the extent and distribution of ice floes in polar waters.

But Norway will not only draw profit from its entrance into the ESA. This industrially highly developed country can also furnish European astronautics with important scientific and technological stimuli. Just in the last few years a new branch of industry possessing very complex technology has been developed in the prospecting and exploitation of petroleum deposits in the stormy North Sea. As a part of this technology a great role has also been played by reliable life-support systems and automatic manipulators for underwater operations. Such facilities are very similar to the systems required for astronautic purposes such as, for example, those used in the planned European orbital station "Columbus."

Astronautic Applications of Know-How Taken From Oceanology

For a long time it has been known that the systems of underwater operation and those used in space have great similarity. In both cases people must work for extended time in an alien environment without the possibility of receiving immediate aid in the event of an accident. In the modification of underwater equipment for use in space Norway is working closely with industry in the FRG.

Also, Norway has for many years been involved in astronautics in a purely scientific program. In 1962 the first high-altitude rockets were launched there and then the Scandinavian country also participated in the Alouette and Esro European satellite projects.

For years now Norway has been preparing intensively for ESA membership. Since 1981 it has been making use of its status as an observer in the European Space Agency without any consultative or voting rights. After January 1987 a newly established state office (the Norwegian Space Center--NRS) will combine all

activities coming under this heading. This Norwegian space center will initially have at its disposal a budget estimated to be about DM 25 million which corresponds to a share of only 1 percent in the ESA budget. Naturally, with a budget like this no great advances can be made in the domain of expensive spaceflight technology and hence it will be necessary for Norway to concentrate its attention upon only a few important astronautic subareas.

It is especially the Norwegian communications industry and computer industry which hope to receive new technical and economic stimuli from ESA membership. To this end special astronautical departments are being set up with research, development, marketing, advertising, and sales capabilities. This involves not only participation in specific satellite cargoes, but also major problems must be dealt with in the design of corresponding ground stations with their great parabolic antennas and extensive computer and radio installations.

In this respect special tasks will be assigned to the Norsk Data Enterprise whose computers have earned a good reputation internationally. The management hopes that Norway's ESA membership will lead to substantial studies connected with the planned European space station "Columbus" and with the third rocket-launching ramp in Kourou (South America) from which will be launched the new Ariane 5 with the Hermes mini space transporter. Great efforts are also being made in this direction by the Tandberg Data Co. whose computer components are widely esteemed. The Micro Electronics Co. has specialized in photodetectors. The Standard Telephone and Cable Factory likewise hopes to get into the business as does also the Ame Space Co.

8008
CSO: 3698/51

WEST EUROPE/AEROSPACE

FRG'S DFVLR STUDIES EUROPE'S SATELLITE BUSINESS AFTER CHALLENGER

Duesseldorf VDI NACHRICHTEN in German 26 Sep 86 p 42

[Article by Thomas Saum: "Europe's Chances in Space Flight: The United States Will Soon Be Out Front Again--DFVLR Study Sees a Strengthened United States in the Satellite Business"]

[Text] Duesseldorf, 26 Sep (VDI-N)--The competitive advantage in the satellite business which came to the Europeans as a consequence of the Challenger disaster will probably not persist for very long according to the results of a study conducted in-house by the German Research and Experimental Institute for Aeronautics and Astronautics (DFVLR). Through the development of new or renovated transporter systems it would be possible for the United States to once again dominate the market at the latest by the end of the century, assuming that the Europeans do not react promptly to this development.

Admittedly the role of the USSR as a satellite transporter is an unknown quantity. As implied by studies conducted by Prof Roger E. Lo of the DFVLR Institute for Chemical Propulsion and Process Technology in Hardthausen am Kocher, the USSR was even before the Challenger disaster far out in front in terms of numbers of transport rocket launches. As summarized between 1980 and 1984 in DFVLR reports the Russians with 473 firings achieved 80 percent of all launchings throughout the world. With 85 launchings including the shuttle missions the United States was in second place, followed by Japan with 13 launchings, Europe with 11, China with 4, and India with 3. But since then the Europeans with their further developed Ariane transporter rocket have overtaken the Japanese.

Despite the use of the four shuttles--the fifth, the Enterprise, is only a demonstration model--more than three-quarters of all American launches were accomplished using traditional rockets. Only in recent years has the manufacture of these rockets been terminated, with the exception of the high-thrust Titan. The remaining models are to be used up until the end of 1986. With this bad decision which became very damaging after the Challenger disaster, the NASA space authority maneuvered itself into a blind alley. Even supposing that these rockets are once again put into production they will not be immediately available.

But even if the United States overcomes these difficulties the Europeans according to Lo will still have a price advantage. He maintains that at least for launches into those geostationary orbits which are important for communications satellites (in which they always remain over the same point of the earth) the European models Ariane 1 through Ariane 4 will in the coming years be cheaper in almost all weight classes. Nevertheless, the scientist credits the United States with good chances over the middle term in the satellite business. Already in the near future it is expected that a new Titan version will be tested capable of carrying unusually heavy cargoes and constituting competition for the soon to be launched Ariane 4.

"Manned wherever necessary--unmanned wherever possible" will be the motto of the future. Nevertheless, according to Professor Lo, NASA must not write off the billions of dollars for the development of the shuttle system. Because, first of all, satellite transport costs would soon become cheaper through the use of new types of propulsion systems in manned missions. And secondly, NASA is planning an unmanned variant of the vehicle which formerly put the shuttles into orbit. Under this arrangement the ferry would be replaced by a cargo container and the two lateral solid-fuel rockets by a liquid-fuel propulsion. This so-called heavy-lift vehicle could by 1997 put about 100 tons into a near-earth orbit and as much as 50 tons into a geostationary orbit.

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WEST EUROPE/AEROSPACE

FRAUNHOFER OFFICIAL CRITICIZES FRG PLAN FOR MANNED SPACE MISSIONS

Munich INDUSTRIEMAGAZIN in German Oct 86 pp 19-20

[Article by Dr Helmar Krupp, professor, Fraunhofer Institute for Systems Technology and Innovative Research in Karlsruhe: "Manned Spaceflight Makes No Sense"; first paragraph is INDUSTRIEMAGAZIN introduction]

[Text] Dr Helmar Krupp, professor at the Fraunhofer Institute for Systems Technology and Innovative Research in Karlsruhe, criticizes the FRG Government's call to send our own astronauts into space.

Unmanned spaceflight has achieved a permanent place for itself in three areas: in the economic realm by means of communications satellites and television satellites, in the domain of national infrastructure by means of weather satellites, and also in science by means of observational satellites which carry out earth surveillance or astrophysical measurements in various parts of the spectrum.

The public expenditures assigned to these tasks have been legitimized by economic calculation and by our cultural heritage. Of course, it is true that in fundamental research, particularly in astrophysics and in high-energy physics, possible applications and the corresponding costs have risen to such an extent that priorities have to be set and, more than ever before, it is necessary to resort to international cooperation and cost-sharing.

But what is the situation now when it comes to spaceflight manned by astronauts and not by robots and what are the goals of such spaceflight? Evidently the above-listed economic and cultural criteria no longer suffice. This may be seen in the following quotation from a thoroughgoing report produced by a high-ranking commission appointed by the American president in 1985: "The Americans were the first and only human beings who ever took a walk on the moon. An entire nation was filled with pride as it watched them. The whole world looked on with baited breath."

Thus here we are in the area of national symbols and demonstrations of power. In the 1985 Expo Fair in Tsukuba several thousand Japanese schoolchildren were conducted à la Disneyland through enormous representations of "space colonies." And in the future such "colonies" will not be confined to the domain of fiction. And the FRG, too, after its D1 mission, has announced its claims to participation in "the conquest of space."

On what basis does the FRG Government justify a public demand, increasing by billions every year, for manned spaceflight?

First of all it argues on the basis of the claim that it will be possible to carry out material-science research under weightlessness; there is talk of "microgravity research." And secondly the government is betting on the possibility of future manufacturing in outer space.

First of all, what is microgravity research? The mixing and separation of various materials, the growth of crystals, thermal convection in fluids having a temperature gradient, and other phenomena of fluid physics and solid-state physics and chemistry depend upon such physical parameters as density, viscosity, specific heat, and diffusion constants. By means of theoretical models and comparison with experiment one finally obtains mathematical formulas which describe these processes quantitatively with more or less accuracy.

Also, in terrestrial laboratories one can study the dependence of these phenomena upon weight--for example, by making measurements of materials of various densities and by making observations during centrifugal acceleration, or by suspending particles or drops in electromagnetic fields.

Hence there is no ground to expect profound insights in the natural sciences through microgravity measurements. Rather such measurements would only provide marginal supplements to terrestrial science according to many: mere scientific lily-gilding. Hence there is little interest on the part of most scientists.

Neither should it be forgotten that microgravity research would annually cost a sum of 100 million marks in order of magnitude. This much expense is required by important programs of state-supported research in such high priority areas as microelectronics, automated manufacturing, biotechnology, materials research, and humanization of the workplace. Since microgravity research is being named as a primary motive for missions such as D1 and subsequent missions we must also include here the costs of hardware and this easily brings us to an order of magnitude of 1 billion marks per year. With this amount one could equip annually four large-scale power plants with demonstration facilities for sulfur removal and antipollution, with the aim of achieving economical solutions to these latter problems. This illustrates the fact that research funding must always take into consideration the ratio of cost to utility and must always give consideration to alternative funding programs.

Fact: The cost of microgravity research has the same order of magnitude as important research programs; the gain to be expected from microgravity research is on the other hand incomparably smaller. It is a form of research which can also be carried out on earth or for short periods in parabolic aircraft flight.

Now, secondly, let us consider outer space production--that is to say, the manufacturing of products in space laboratories or space factories. Let us say this right at the outset: Thus far there have been no exact data, not to speak of cost calculations or even cost utility comparisons which one might

take seriously, with regard to such manufacturing. Rather the engineering public has tended to avoid any deeper discussion of this matter.

The people interested in outer space production attempt to awaken in this area primarily the following expectations: high-quality separation and purification of biochemical substances; the manufacture of ultrapure semiconductor materials, and the manufacture of turbine blades strengthened by means of a "support surface," these blades to be used in aircraft propulsion systems.

On the occasion of the "technology discussion" of the Association of German Engineers which was attended by highly placed specialists at the beginning of this year in Cologne a representative of the Messerschmitt-Boelkow-Blohm Co. and of the German Research Institute for Aeronautics and Astronautics offered an opinion in this context. None of these outer space manufacturing proposals received any scientific support from the many representatives of industry, government, and science; on the contrary serious objections were brought forward. In particular, attention was drawn to the fact that recently a variety of highly developed material purification and separation processes have come into existence and that also the cost calculation adduced for the manufacture of the turbine blades simply could not stand up against industrial standards.

What is it that nevertheless keeps the manned spaceflight programs alive? Here there are a number of factors and groups of interested parties working in combination:

The governments because of slow rates of economic growth and because of international competitive pressure feel themselves compelled to adopt some form of action. Large-scale programs such as that of manned spaceflight are relatively easy to put in motion since this requires the consensus of but a small number of entrepreneurs and a few officials. And in part it is also the case that such programs constitute, to employ a technical term, "symbolic politics."

Also, the armament firms are extraordinarily interested in contracts for the construction of satellites and rockets because such contracts involve billion-mark projects.

The same applies to the defense ministry since the latter has reason to expect that our development will take a course similar to that of the United States where the civilian spaceflight of NASA has opened the way to SDI.

The interests of this triple alliance are reinforced by the circumstance that the corresponding alliances of the other industrial countries stimulate competition and finally engage in concerted actions as well. The minister of finance, the appropriate committee of the FRG Bundestag, and the majority of the population are persuaded through the publicistic media. Let us quote here from a document of the European Space Agency: "With the aim of supporting the space program an extensive mobilization of public opinion and of political circles is absolutely necessary. This calls for large-scale publicity projects such as those of Ariane and Spacelab."

Manned spaceflight, including that with civilian motivation, has a premilitary character. In order to justify substantial public expenditures the supporters of manned spaceflight therefore contend that there would be a so-called civilian spillover--that is to say, techniques which were developed for premilitary or military applications could also be used through technological transfer for civilian and terrestrial purposes.

In a study commissioned by the German Federal Ministry of Research and Technology this argument has been refuted. About 800 references were found in the literature; 200 of these had a direct bearing upon the question, 67 percent of them came from the United States. In much simplified terms the result of this investigation may be described as follows: Civilian markets are highly specific and lead to a high degree of differentiation among demanded or salable products. A long-distance bomber has therefore quite different specifications from those of a civilian Boeing or an aircraft in the Airbus series. This applies even to highly integrated chips. In my institute, too, we were brought to the same conclusion when we attempted in a 10-year project to transfer into other enterprises and areas of application almost 7,000 patents or patent declarations which had arisen from publicly supported research programs. There was success in only 10 cases of licensing.

Then there are the following arguments which speak against hope for civilian technological transfer: All basic inventions have originated in civilian laboratories: nuclear fission, the automated computer, the transistor, the integrated circuit, optoelectronics, masers and lasers, fiber optics, genetic engineering, and superalloys. And NASA, too, when spillover failed to take place spontaneously, initiated expensive transfer programs which likewise had little success. (It is also well known that enterprises deeply involved in manned spaceflight and in the armament area have not been successful in the civilian domain.) And finally: the Japanese successes were achieved without any premilitary or military investments. Conversely, neither the USSR, nor France, nor Great Britain, all of whom have invested substantially in noncivilian areas, has been particularly strong in the technological world market.

Our national pride can lean upon our export successes. These latter are served by a well-conducted state program of direct research support for civilian purposes. The commitment of funds outside the area of competition is counterproductive.

Our politicians should give thought to the following views: The most economical solution would be the thoroughgoing elimination of manned spaceflight. "Microgravity research" can be carried out on earth at 1 percent of the alternative cost. In the event that we cannot fully succeed in adopting this latter course we should at least engage in the smallest possible participation in foreign large-scale projects. Departmentally speaking manned spaceflight should be transferred to the responsibility of the Federal Ministry of Defense where it belongs.

In this way we would acquire finances sufficient to maintain and expand our position in the area of unmanned civilian spaceflight.

After the last spaceflight disaster there has been increasing criticism of manned spaceflight also in the United States even though there such activity can be more easily justified with military arguments than is possible in the FRG.

WEST EUROPE/AUTOMOBILE INDUSTRY

RENAULT OF FRANCE NEEDS FR 4 BILLION FOR SUBSIDIARY BAILOUT

Paris LE MONDE in French 3 Oct 86 p 35

[Article by Claire Blandin]

[Text] Renault, because of its unconscionable common-law status--that of a "regie" [state-controlled activity]--can get away with situations that are intolerable, even for its subsidiaries. Thus, the Regie Renault has for several years been mired in red ink (-15 billion francs as of yearend 1985) without its CEO having to file its balance sheet with the Tribunal of Commerce at Nanterre. Not so, however, for its RVI [Renault Industrial Vehicles] heavy-vehicles subsidiary, which, like all good corporations, cannot continue operating on a negative shareholders-equity basis for more than 2 years. The coming 31 December is the fateful day.

Thus, the parent company has 3 months in which to find 4 billion francs. The net balance was 2.2 billion francs in the red as of yearend 1985, to which must be added [estimated] losses totaling 1.1 billion francs in 1986, plus a viable RVI working-capital shot-in-the-arm of 700 million francs. Half of this total sum could be found in a revaluation of current assets. The remaining 2 billion francs must be dislodged elsewhere. A subsidy in hard cash appears to be out of the question, since Renault hasn't a penny to its name... Unless the state, which has to some extent lined its coffers through the sale of Elf shares, were to finally grant Renault the additional appropriation referred to in last April's special national budget. Renault could then turn around and transfer these funds into the RVI pouch. They would still have to total at least 2 billion francs.

A surer solution would be for Renault to transfer shares, in the amount necessary, to its heavy-vehicles subsidiary: In this case, Renault Holding's 42-percent share in Mack, the American heavy-vehicles manufacturer, which represents $250 million (or a little less than 2 billion francs).

After having transferred 2.86 billion francs to its subsidiary in 1984 and 1985, Renault will thus again pay its tribute to the truck in 1986. But the corrective measures being instituted by RVI are encouraging. For the fifth consecutive half-year, RVI has cut its losses: From 800 million francs in the

first half of 1985 to 460 million francs in the first half of 1986. And this despite a 3-percent drop in revenue (from 8.7 billion for the first half of 1985 to 8.4 billion francs for the first half of 1986). This drop is owing to the nosedive taken by large-scale exports (-17 percent) which was not offset by the rise in the French domestic market (of which RVI is seeking a 40-percent share for 1986) and the growth of certain European markets. Exports for the first half of 1986 represent 32 percent of revenues versus 37.7 percent in 1985.

Despite this situation, but especially in view of the company's "Plan for the Improvement of Competitiveness" currently in operation (2,624 job reductions, equal to 12 percent of its regular employees, between now and the end of 1987), Mr Gras, RVI's CEO, is maintaining his objective: Bringing his enterprise out of the red in 1988, indeed beginning in the final months of 1987.

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WEST EUROPE/AUTOMOBILE INDUSTRY

RENAULT CHIEF BESSE TALKS ABOUT STRATEGY FOR CHANGE

Paris LE MONDE in French 30 Sep 86 pp 1, 40

[Interview with Georges Besse, chief executive officer of Renault, by Claire Blandin and Guy Herzlich: "Renault Will Earn a Profit by the end of 1987"]

[Text] A deficit of 12.5 billion francs in 1984, 10.9 billion in 1985... As recently as only a few months ago, no one gave much for the chances of a turnaround at Renault. The fact is, however, that the situation is improving. In the first interview he has accorded to the written press since his arrival in January 1985 as head of the nationalized group, Mr Georges Besse explains what is in the process of changing at the Regie Renault.

[Question] Renault is doing better. That is the message you now want to convey. The improvement is visible in the company's sales. But when will it be visible in the balance sheet?

[Answer] As of now, it is only a forecast, but based on the observed trend since March, I can say that our 1986 loss will be between 5 and 6 billion francs. We will stabilize our indebtedness, whereas, as of the beginning of the year, we were projecting a slight rise. Already in 1985, we had contained its growth, limiting it to 6 billion francs, whereas the outlook when I came into the company was for an increase of 13 to 15 billion francs. I am not saying that it is glorious to have capped our indebtedness at 62 billion francs, but it is already a considerable step forward. This is the first time in at least 10 years that indebtedness will not rise.

[Question] Why then such sizable losses in 1986?

[Answer] First, because our operation has turned positive since March but not sufficiently so. It covers our investments but not repayments. Logically speaking, this should start around the end of next year. Then too, we must still make provisions in 1986 for what in France are euphemistically called social plans, and for all the operations we are seeking to shut down here and there, like the shutting down of our assembly plant in Mexico.

[Question] Does this mean that next year, with correct operation and without all these provisions, you would be making money?

[Answer] With a positive operating balance, we will indeed be making money at the end of next year.

[Question] Will you succeed in reducing Renault's indebtedness?

[Question] Next year, it must be reduced. There are but three ways to do this. First, a positive operating balance; we are working on this. Secondly, sell assets or liabilities, which amounts almost to the same thing. And thirdly, appeal to our shareholders. As far as my action is concerned, it is limited to the first two ways. I have no power as to the third.

[Question] Nevertheless, have you requested, and obtained, money from your shareholder?

[Answer] Yes. What had been planned under Mr Beregovoy--3 billion in 1985 and 3 billion in 1986. This year, I have received my 3 billion. An appropriation of 4 billion had been planned for 1987, but I have had no confirmation of it.

[Question] And what about the additional appropriation provided for in the special budget?

[Answer] When I heard about this special budget, I went to see Mr Balladur, who told me that nothing had yet been decided, that something had been put into the special budget but had not yet been apportioned. This is still the situation: This special budget has not been apportioned. So...

[Question] Are economies not being made to the detriment of investments?

[Answer] We have cut back our investments to around 6 billion francs in 1986 and we intend to hold them down to between 6 and 7 billion in succeeding years. This appears reasonable to me in view of our idle productive capacity, which is of the order of 15 to 20 percent. The problem is in choosing our investments from the standpoint of greater effectiveness, more automation.

[Question] Those are investments of an industrial nature; but what about product-line investments?

[Answer] At Renault, design studies are not charged up to investments but rather to current expenses under our annual operating budget. I must tell you that in all the economies we have made, that is the only sector that not only has not been subjected to reductions in personnel but on the contrary has actually been increased. It had 3,600 persons at the start of 1985; now it has around 4,000. By comparison, other personnel has been cut back by something like 25 percent. We want our line of vehicles renovated--not

excessively hastily but on a regular basis--so as not to find ourselves in the ridiculous situation of 1983, 1984 and 1985, with slightly outdated models and a competition that made things difficult for us.

11 Percent of European Market

[Question] You are in the process of catching up again...

[Answer] Yes, but the first 2 months of the year were not good. All the manufacturers were awaiting the recovery of the French market, which has been exceedingly soft for the last 2 years. Things changed in March, with an exceptional volume of orders--so many, in fact, that our overall forecast of 1.88 million new car registrations for the year is correct. Renault's turnaround coincided with this recovery. No doubt, our clients were waiting for us to bring out our R 21 in March. And this new car indeed had a pulling effect on the others--the R 25, the R 11, and even the Super 5. We are now on target with our marketing plan and we expect to have around 31 percent of the market between now and the end of the year.

[Question] On the other hand, how do you explain the fact that in the European market, where you made good progress last year, you have not done as well this year?

[Answer] That is true. We made a slower start this year than in 1985; and that surpised us. There are at least two explanations. The first is that the R 21 was not launched in the other countries of Europe until May. For 5 months we were not present; that counts. The second is the slowing of our sales in Italy, where we had attained a penetration of 10 percent in 1985, which was somewhat high. Fiat, which realizes 70 percent of its sales in its own country, unleashed a considerable counteroffensive, pricing its Uno and Uno Diesel extremely low. Well, since we don't engage in price-cutting ...

[Question] Is that now the company policy?

[Answer] It is the Georges Besse policy. Thus, we are going to drop down to 8.5-9 percent in Italy. But this drop will be offset by the other countries.We hope to sell 639,000 vehicles in Europe in 1986 so as to consolidate the advance we made last year. But in view of our price increase, our share of the European market will be less. In all, we hope to get around 11 percent of it, including France.

[Question] And your goal for 1987?

[Answer] We would like to maintain that score of 11-11.2 percent. Our problem is not one of volume at any price; it is one of making money by building cars that sell well and please the client. True, Renault, at one point in time, "bought the market." But buying additional market share is expensive. Even General Motors, which has waged the offensive these last few years, is beginning to realize this.

A Rubber Standard-Meter

[Question] You are a European builder, but also an American one with your AMC [American Motors Corporation] subsidiary. Here, as across the Atlantic, what exactly you wish to do with AMC, and why you are so insistent on holding on to so costly a "beachhead," are questions that are still not very well understood.

[Answer] Much has been said and much continues to be said concerning AMC. However, the fact is that, last year, of the Regie's losses totaling 10.9 billion francs, AMC's contribution to that total was only 400 million francs. I'm not saying that this sum is negligible, but you can see, nevertheless, that Renault's difficulties are not owing to AMC. The strategic idea on which Renault's presence in the United States is based is a simple and, in my opinion, a sound one. The American market is the world's largest. It is as large as the European market and, unlike the latter, it is homogeneous. But an unfortunate choice was indeed made; namely, that of the "subcompact." It was at a time when the whole world expected an oil shortage and there was a rush toward the small car. The Alliance and the Encore, the American versions of the R 19 and R 11, were highly successful at that point. Then came the Japanese competition with its considerable price advantage. AMC and Renault declined to wage a price war that would have been suicidal, and we assumed the risk of a drop in sales. Don't forget that AMC also builds Jeeps, which sell well and on which we make money.

[Question] But that is not enough...

[Answer] Renault has reacted well in launching the design of an American top-of-the-line car, the 58, which is expected to turn a profit and for which we are building a plant in Brampton, Canada, where these cars will be coming off the assembly line by the end of 1987. Concurrently, it was decided to build the R 21 in France to American standards for shipment to the United States.

[Question] Will you be making money there on these R 21's?

[Answer] Normally, we should make a profit on them with the dollar at 8 francs. With the dollar at 6.50 francs we would no longer make money.

[Question] Would you be losing on them?

[Answer] Yes. You know, it is not very easy to be an international industrialist when one has to work with a standard meter made of rubber. At the time the calculations were made for the R 21, the dollar was worth 10 francs. It is a difficult problem for the whole world. Look at the Japanese. They are not complaining because they are a taciturn people who try hard in silence; but you know that Nissan, for the first time in 30 years, has posted a loss, because all of its profits were being made in the United States.

Be that as it may, AMC's fate is not tied to the R 21. Its true success rests with the 58 and its offspring.

[Question] Is AMC in a position to wait until the roll-out of the 58 without affecting your accounts?

[Answer] Yes. We have resolved the problem of the old Kenosha plant, with Chrysler picking up the expenses and using it to assemble its top-of-the-line models, filling it to capacity for the next 3 years. To avoid having to transfer funds to AMC during that period, we have carried out a stock exchange operation that has netted 1.4 billion francs without Renault putting up any security.

[Question] Without a subsidy from Renault?

[Answer] I have said that I do not intend to put money into it this time; nor until the bringing out of the 58. I believe that by the end of next year AMC will be in a favorable position.

[Question] But you do have financial commitments with respect to AMC representing a risk. To what extent?

[Answer] Renault gave the Canadian Government a "letter of assurance" on $100 million for the construction of the Brampton plant. We have also given one to Chase Bank for around $300 million. We have $300 million of capital in AMC, and derived loans amount to $200. Also it is we who are paying for the design studies on the 58, which belongs to us. That represents a credit of $130 million.

Reduction of Staff

[Question] Potentially, then, you have commitments totaling over $1 billion?

[Answer] Indeed, a rather substantial commitment. That is why I have frequently stated that we cannot simply abandon everything and walk away. When you're soldiering in the regiment, and you're sound asleep, and suddenly a hobnailed boot falls on your head, the first thing you must not do is jump up and chuck the boot out the window: Generally speaking, it's your own...

[Question] That does not prevent you from continuing to seek a partner?

[Answer] No. I am still seeking one.

[Question] In short, you intend to remain a world-class car builder?

[Answer] The Hexagon is too small for Renault, as it is also for Peugeot, for that matter. Being a domestic builder would be suicidal. True, one could build cars only for the European market. That is what Fiat does. Yet, Fiat maintains a presence in the countries representing major export markets...

[Question] And do you intend to continue in heavy vehicles?

[Answer] We are in them. It's hard to foresee the future. Certainly, RVI has been in the throes of a desperate crisis that has been very costly to its parent company. But RVI's situation is improving faster than had been anticipated in the planning, which is based on a profitable year in 1988.

[Question] Does that mean that RVI could become profitable as early as 1987?

[Answer] As of yearend 1987, yes, I think so.

[Question] Can you, however, afford to disregard the teaming-up that is occurring in the sector?

[Answer] No, but we have sought a partner in Europe and in the United States and have been unable to find any.

[Question] And what if a Japanese firm were interested?

[Answer] Should that come about, we would still have to talk. That would open up to the Government a whole new set of considerations; for, after all, the Government is the shareholder, and the idea of a Japanese partner has yet to be agreed.

[Question] It is nevertheless receiving attention...

[Answer] That is true. And what's more, I note it with some concern. For of course, they do possess an efficiency that we do not have, especially in the building of personal cars. But we are waiting for them to round the turn after they have actually become installed in Europe and the United States and have worked with workers who are not altogether Japanese workers. That being said, they bring methods with them that we have not fully assimilated as yet.

[Question] And from the standpoint of quality, have you resolved your problems?

[Answer] That has indeed been one of our major problems. But we have made considerable progress. At the start of 1985, our coefficient of quality was, on average, all plants combined, 128. Please note that perfection is taken to be 162, and that Mercedes, the best, posts a 145. We first "homogenized" all of our plants and raised our average to 135. We fully expect to attain 138 by the end of this year.

[Question] When you talk of efficiency, how do you view the future from the social standpoint? Do you think we will be compelled to accept staff reductions parralleling any gains in productivity?

[Answer] I am convinced that we will succeed in rescuing the French automobile industry. On the other hand, I don't think it will be a future purveyor of jobs. Since we are no longer in an expansionary phase and productivity must be increased, this will actually translate to a reduction of personnel. Fifteen years ago, Toyota built 1 million cars with 70,000 workers. Today, it manufactures 3 million cars and still has 70,000 employees. I see no reason why we should not be able to do as well as they. But it will take time. It is easier to triple production keeping the number of employees constant than to divide the number of employees by three keeping production constant.

[Question] Does this mean that you are on the verge of dividing your staff by three?

[Answer] No, because, after all, our productivity has risen during the past 3 or 4 years. And 15 years ago, the Japanese themselves were not too productive. Taking the example of Renault, our productivity has risen by 25 percent in the space of 2 years. Draw your own conclusions: Our production in number of cars per man per year (when I say "car," I mean one car on average) was 10.9 in 1984, and will be 13.6 by the end of this year. Next year, we expect to attain a figure of 15, which would put us among the top three Europeans. We have done all of this in silence.

Echoing Consensus

[Question] Does this mean that you have agreement from the unions?

[Answer] Obviously, no union is going to tell you that it agrees with what has occurred and with what you are in the course of doing. Nevertheless, you have not heard any explosion. We have tried to do things as humanely as possible, although in an extremely profound manner. This has sometimes produced echoes but never exceeding a level that is normal in circumstances of this nature.

[Question] Is Billancourt still a symbol?

[Answer] From the French viewpoint, certainly. But I am not sure that the same is true at the Regie.

[Question] How is the sharing of power ["cohabitation"] with the CGT turning out?

[Answer] It is not up to us to select our interlocutor. We take the one that is given to us. And it is not "cohabitation." It is altogether another thing. I have always believed that, in an enterprise, the unions have as their role the defense of the workers, and the management that of managing. What has been a bit too often the case at Renault heretofore is a confusing of these two roles. The result has been that the union has done its job poorly and so has management.

[Question] Will the CGT attitude you have indicated--"It is not a consensus but everything occurs as if it had been agreed to"--necessarily continue?

[Answer] I realize that dialogue is rather awkward, because a union is an entity that, inherently, cannot discuss a cutback of staff. But I believe that everyone has re-thought the ideas that once prevailed regarding this enterprise. The overseeing authorities, without question, but also the white-collar employees and the unions. There can be no doubt that no one imagined such a situation as this could occur.

[Question] After 2 years as president of Renault, what is the thing that has most struck you?

[Answer] When I arrived in this company, the harshest of criticisms were being leveled at it by everyone. Its employees were being referred to as slackers, as budget-guzzlers. In the midst of this avalanche, the white-collar and blue-collar employees and the management employees of Renault gritted their teeth and shouldered their tasks. The company as a whole put forth a prodigious effort to bring out new vehicles, while increasing productivity. I have been in French industry, and observed it, for 30 years. I must say that I have never seen the likes of this effort elsewhere. I think this country can be proud of Renault. Regardless of what some people are saying.

[Boxed insert p 40]:

Renault in Figures (1985)

Revenue: 122 billion francs;

Losses: 10.9 billion francs;

Employees: 196,414;

Production: 1.963 million vehicles;

Market shares: France: 28.8 percent; Europe (including France): 10.7 percent.

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CSO: 3698/46

WEST EUROPE/AUTOMOBILE INDUSTRY

BRIEFS

FIAT-MATRA AUTO VENTURE--Fiat has just announced the signing of an agreement with Matra in July of this year to form a sizable industrial group in the automotive electronics and carburetion sector. The venture being formed by the bringing together of the French group's subsidiaries (Jaeger and Solex) and the Italian ones (Borletti Veglia, Weber and Cavis) will represent 37 plants throughout the world, employ 21,000 persons and realize an annual revenue of 7 billion francs. This agreement enables the two partners to become Europe's number one in the field of automotive equipment. The new firm, the name of which has still not been disclosed, represents a capitalization of 1,500 million francs and is owned 65 percent by Fiat and 35 percent by Matra. This joint venture, which has received the backing of the French Government authorities and of the Renault and PSA automotive manufacturing enterprises, is subject, however, to two conditions: Secrecy as to its supply operations and the possibility of its becoming a 50/50 association. The new Titan thus created should quickly become a formidable competitor of the Bosch firm, the present leader in the automotive equipment sector. [Text] [Paris ELECTRONIQUE ACTUALITES in French 12 September 86 p 3] 9399

MATRA EXPERIMENTAL CAR P.29--Paris--MATRA Automobile exhibited, at the Auto Show, its experimental vehicle "P.29," equipped with an infrared radar and video rear-view device, which synthesize the technological innovations produced by the builder's research program. The vehicle meets the requirements of a set of specifications dealing essentially with its acceleration, roadability and braking. The vehicle has a length of 4.10 meters, a weight of 840 kg, and performance characteristics as follows: Acceleration from standing start: 100 meters in 5.6 seconds; from standing start to 400 meters: 12.9 seconds; from standing start to 1,000 meters: 23.8 seconds; speed over distance of 1,000 meters: 232 km/hr; power: 255 hp at 7,400 rpm with a weight/power ratio of 3.3 kg/hp for a cylinder capacity of 1,995 cubic centimeters. These results were obtained through intensive use of composite materials, the development of an architecture enabling a distribution of optimized weights, and aerodynamic design studies. The electronic-injection engine is supercharged by a variable-ratio gear-driven compressor. [Text] [Paris AFP SCIENCES in French 9 Oct 86 p 87] 9399

CSO: 3698/46

WEST EUROPE/COMPUTERS

FRENCH SOFTWARE FIRMS STRONG IN EUROPE

Paris ZERO UN INFORMATIQUE in French 18 Aug 86 p 2

[Article signed G.H.: "Five French Among the Ten European Leaders"; first paragraph is ZERO UN INFORMATIQUE introduction]

[Text] The French software industry is generally said to rank second in the world. In Europe its presence is very strong with five firms among the top ten.

The French software industry is still doing well and holding out favorably in Europe. Indeed, five French firms are among the ten with the Old World's highest turnovers. That is the first conclusions of the 10th survey carried out by the European Computing Services Association [ECSA].

This year Cap Gemini Sogeti tops the list with a European turnover of $195 million, rather easily surpassing IBM's services division. Remember that Cap Gemini Sogeti ranks fourth in the world list of companies specializing in intellectual services, after Electronic Data Systems ($947 million) now associated with General Motors, Computer Science ($712 million), and Informatics ($191 million). Note that the FRG and the UK have only managed to get one firm each in this list.

Cap Gemini, Fourth Worldwide, Takes the Lead

Whereas GSI [General Data Processing Services Company] and the Sema-Metra group have managed to move up two and three places respectively in the rankings, CISI [International Company for Data Processing Services] is relegated to seventh place. As for SG2, a Societe Generale subsidiary, it no longer appears on the list due to difficulties it had in 1985. After a period of strong growth both geographically and sectorially, SG2 decided to focus its activities on two topics: automated banking and intellectual services. Before this restructuring SG2 had no less than 80 subsidiaries. Its difficulties were reflected in last year's Fr 68-million losses.

Disregrading IBM's service activities, it is again Cap Gemini Sogeti which has the highest turnover outside the Old Continent. Nevertheless, with $52 million, its activities outside Europe dropped slightly compared to the preceding year. Fifty-three percent of the 1985 turnover was realized in France, 30 percent in Europe, and 27 percent in the United States [figures as published].

Profitability is also one of Cap Gemini Sogeti's strong points. Its 5.3-percent profit-to-revenue ratio indeed exceeds the profession's average. The only flaw in this positive picture is that the U.S. contribution to the net result after taxes only amounts to 13 percent of the total.

Table 1. Top Ten European Software Service Companies
Source: ECSA

Rank	Firms	Country of Origin	Number of Employees	European 1985 Turnover (million $)	Total 1985 Turnover (million $)
1	Cap Gemini Sogeti	France	4,400	195.1	247.3
2	IBM	U.S.	-	147.9	-
3	GSI	France	2,300	135.2	139.1
4	Geisco	U.S.	1,000	125.3	759.6
5	Datev	FRG	2,030	121.8	121.8
6	Sema-Metra	France	2,400	103.0	128.6
7	CISI	France	3,050	94.6	171.4
8	Scicon Int.	UK	2,900	91.4	202.8
9	CCMC	France	1,390	84.4	99.0
10	Volmac	Netherlands	1,500	84.3	84.3

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WEST EUROPE/COMPUTERS

FRENCH SYSECA DEVELOPS MILITARY SOFTWARE

Paris ZERO UN INFORMATIQUE in French 14 Jul 86 p 28

[Article by Edouard Launet: "Syseca Introduces Artificial Intelligence in Large Real-Time Systems"; first paragraph is ZERO UN INFORMATIQUE introduction]

[Text] Computerized command systems are beginning to incorporate expert systems: Here, artificial intelligence [AI] is being used for real-time military applications.

For approximately 20 years, real-time data processing has been moving into army command systems. For example: SENIT (System for Naval Utilization of Tactical Data) developed by Syseca for the French Navy, is designed to receive and process various data from radars, optical surveillance systems, etc.... SENIT allows each separate unit to assess a threat, to use the appropriate weapons and decoys, and to exchange data with the rest of the fleet.

At present such systems can benefit from artificial intelligence techniques and in particular from expert systems. It is also necessary that they be able to take into account external events occurring over a period of time, to cope with time parameters (taking into account constraints indicating exactly when an objective must be achieved and how long the conditions for achieving that objective are verifiable, and to provide a temporal representation of the knowledge.

Syseca, a data processing and engineering services company, has been studying these problems for approximately 3 years and has established an AI team of about 20 people, 15 of whom are specifically working on real-time systems applications.

An initial goal was to develop as part of the SENIT system an expert system to identify moving bodies near ships equipped with the system. The system processes data provided by SENIT; it analyzes radar observations as they arrive and attempts to correlate the data according to a rule base. The expert system defines the object class to which the moving body probably belongs (aircraft, missiles, various types of ships) depending on the radar echo size, on the speed of the moving body, on changes in its heading, and on its maneuvering area. The system reexamines this probability as soon as new data become available.

Develop the Data Processing System for Future Nuclear Aircraft Carriers

On this project Syseca worked with Stammer, a tool developed by NOSC (Naval Ocean Systems Center) in the United States. Stammer was rewritten in Le-Lisp and transferred to VAX. A Common Lisp version of this inference engine (called Stamina) has likewise been put on Symbolics.

However, Syseca preferred Inference Corp.'s ART tool (now distributed in France by Syseca) for the development of a "complete" model of an expert identification system. Rather than maintaining a set of probability factors, ART is capable of parallel-processing several hypotheses on the nature of the moving bodies to be identified while maintaining the correlation among the various suppositions (ART "viewpoint" mechanisms).

Moreover, the Inference Corp. tool for developing expert systems seems particularly adapted to real-time processing. The knowledge base is compiled as a conditional network. The facts (observations) immediately generate the adequate rules in the network, hence the very short execution times.

This new project (Triade) is conducted in cooperation with the Navy's Programming Center and is directed by weapons Engineer Grojean. It started last October and will probably finish by the end of 1987. No operational military application has been planned for the near future.

Triade is rather a feasibility study for future systems such as the tactical data management system for the nuclear aircraft carrier which is to be operational in 1996. Shorter-term civil applications could be considered, particularly in the field of surveillance systems for maritime routes just off the French coasts.

The application of expert systems to large real-time systems is, however, not the alone concern of Syseca's AI group. Other teams are also working on object-oriented programming and its simulation applications, on constraint planning, and, finally, on computer-aided instruction.

In computer-aided instruction the objective is to improve student-program interaction. A system called PRIISME (Intelligent Interactive Recursive Program Based on Multiexpert Systems) is being developed. It includes an expert in the subject taught, a pedagogical expert (based on the evaluation of the student's profile), and a simulation expert. The first application will be teaching the "in-house" method of conducting projects (MEDOC). PRIISME operates on VAX in Le-Lisp.

Artificial intelligence will also be introduced in MUST, the multimedia DBMS [Data Base Management System] currently being studied by Syseca. MUST, to be completed by 1990, will have natural language interfaces and mechanisms assuring the data base's data security (integrity constraints) and providing access to deducted data (deductive data bases).

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WEST EUROPE/COMPUTERS

BULL'S STRATEGY, FINANCIAL PROSPECTS OVERVIEWED

Paris ZERO UN INFORMATIQUE in French 15 Sep 86 p 4

[Article by J.L. Cousin: "Waiting for Privatization. Bull: Slowdown in Growth"; first paragraph is ZERO UN INFORMATIQUE introduction]

[Text] Bull's growth in 1986 will be a few points below last year's. But as far as Managing Director Francis Lorentz is concerned, the profit goals will be reached. New announcements are expected.

"The latest announcements are only the first step in a period which will be particularly full of them. In fact the coming 9 months will see a major renewal of our entire product line. This constitutes a challenge for us from the industrial, technical, and commercial viewpoints."

Choosing his moment a few days before the Sicob fair and speaking within the setting of the Villeneuve-d'Ascq plant--with a background of an exceptionally blue Lille sky and green open spaces--the Bull managing director could not have imagined a better setting to discuss "Blue Green."

Jacques Weber, another executive committee member of the managerial staff who is in charge of the group's technical management, stated in turn: "We are embarking more and more on a continuing course toward distributed data processing interconnected by networks."

Francis Lorentz made it clear that the recent announcement of the integration of the Micral 30 and Micral 60 microcomputers (and others) in the clusters of Questar workstations was important in this context.

Speaking about a topic which is very much in vogue, i.e., value-added networks, Francis Lorentz thinks that "it is necessary, above all, to rigorously ensure competition. Strict and unambiguous rules must be established concerning standardization and rate schedules for these networks. All this must be handled in a European context. There should be cooperation among the various administrations."

Reviewing the various possible types of networks, Francis Lorentz stated that, as far as his group is concerned, "Bull does not regard its position as monolithic. We offer services to our customers and offer other services related to communication, e.g., communicating electronic data from and to any place in the world, whatever the different interfaces. In addition, we will offer network applications following many agreements with various data processing and engineering services companies [SSII]. We will thus establish a catalog of network-distributed products."

Concerning the development of this year's turnover, a certain slowdown in growth is expected compared to 1985 both because of the worldwide economic slump and French preelection politics. Bull expects, nevertheless, a share of two digits over that of the general market. As regards profits, and subject to the usual provisos, "the goals defined in 1985 will be reached."

Remember that the French number one's net profits amounted to Fr 144 million in the first half-year, against Fr 39 million over the 6 months of the preceding year.

A policy of major investments will be followed. By 1987 investments will amount to 8 percent of the turnover which will by then be in the neighborhood of Fr 20 billion. R&D expenditure, represents 10 percent of the turnover (36 percent in medium and large systems, 25 percent in data processing and distributed office automation, 11 percent in artificial intelligence, etc.).

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WEST EUROPE/COMPUTERS

BRIEFS

TWO NEW ESPRIT PROJECTS--CRIL [Industrial Software Design and Production] signed a definitive agreement on two Esprit projects with the EEC at the end of July. The Alpes and Iside projects were presented in the field of advanced data processing. The first project's objective is to define and develop preindustrial prototypes in logical programming environments. CRIL is the prime contractor for the project, which involves 10 partners and represents 90 man-years of work. Iside's objective is to study and validate technical concepts which can be used in future data base management systems. It represent 35 man-years of work, and CRIL will participate along with six partners, including SAGEM [Company for General Electricity and Mechanics Applications] as prime contractor. [Excerpts] [Paris L'USINE NOUVELLE in French 14-21 Aug 86 p 21] 25026/12781

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WEST EUROPE/MICROELECTRONICS

EC PREPARES ANTIDUMPING MEASURES AGAINST JAPAN

Paris ELECTRONIQUE ACTUALITES in French 5 Sep 86 pp 1, 17

[Article by D. Giraud]

[Excerpts] The agreement concluded last 31 July between the United States and Japan concerning price restrictions on Japanese memory chips and the opening of the Japanese market to American products created a commotion within the European Community. The agitation of the EEC countries, excluded from the U.S.-Japan negotiations, led to the initiation of anti-dumping measures against Japanese manufacturers of DRAM and EPROM chips who sell to their European customers at prices substantially lower than the cost price of these components.

Although European manufacturers are unanimous in their demands for severe anti-dumping measures against Japanese producers, the enthusiasm of certain European governments for these requests is questionable: More specifically, the FRG is reluctant to use this weapon, as is Great Britain, which is flooded by Japanese products.

The stakes of this action are high, since its objective is to preserve European autonomy in the manufacture of memory chips. The Europeans want to continue and encourage the creation of enterprises in the areas of so-called "state of the art" and strategic electronic components.

Europe Is Mobilized, Initiates Action

The European Community countries have begun to act against the "perverse" effects of the U.S.-Japan agreement. Because Japan can no longer as easily dispose of its production of memory chips on the American market, it must logically turn toward the European market. This is the line of reasoning adopted by the European manufacturers. In fact, the situation may only become worse, since recorded instances of dumping have already prompted European semiconductor manufacturers (SGS, Thomson, Philips, Siemens...) and American firms with European branches (Texas, Motorola...) that belong to the ECA (European Semiconductor Manufacturers Association) to formulate

a protest against those cases of dumping concerning 256K DRAM and EPROM chips (as well as logic components and ASICs). An action was initiated in Brussels and the EEC will present its grievances to the Japanese government. Anti-dumping measures similar to those adopted by the U.S. government are sought by ECA members. The ECA would also like to see openings in the Japanese market in sectors in which Europe is competitive with Japan. The insidious blocking of exports to Japan resulting from the mandatory passage through Japanese distribution companies controlled by the major groups would be repealed.

European producers have been formulating these demands for several months, but the proceedings instituted by the EEC in its attempt to participate in the negotiations between Japan and the United States were dismissed. The EEC, thus excluded, cannot allow the United States to assume the role "international policeman" in monitoring world prices for memory chips and it cannot accept to pay the consequences of the agreement, since the price of memory chips sold on the European continent cannot be controlled.

In the same proceedings, the EEC will air its grievances during the next international GATT trade conference to be held in mid-September, despite the failure of previous, similar proceedings. (The proceedings instituted by the EEC during bilateral agreements concerning steel, agreements from which it was excluded, resulted in failure). The European firms are therefore working hand in hand, although certain users are happy to purchase memory chips at a low price. It is in fact Europe's autonomy which is at stake and this autonomy is linked to the creation and expansion of manufacturing companies. Although Motorola has already abandoned a project to invest in a component factory in Scotland, agreements signed by Philips and Siemens for the manufacture of 1 MBit and 4 MBit DRAM chips (for 1988), the production of EPROMs by Thomson, of bipolar RAM and PROM chips and CMOS RAM chips by RTC reflect Europe's will in the matter. Thus, according to Dataquest projections, European component manufacturers have an opportunity to reconquer part of their domestic market.

And the future holds many surprises. It is not impossible that one day, Japanese, Americans and Europeans will unite in a common front to combat dumping by Korea.

In fact, South Korea has made substantial investments in various electronics fields, including the color cathode ray tube sector where production, at this time, is 10 times greater than domestic consumption....

WEST EUROPE/MICROELECTRONICS

NEW EUREKA, ESPRIT PROJECTS APPROVED

French, UK OSI Project

Paris ELECTRONIQUE ACTUALITES in French 5 Sep 86 p 7

[Text] In the context of Eureka, a joint proposal from Bull, Copernique and ICL was approved to build a multi-media computer system called Moses (Multi-media Open System European Standard) with the capacity to manage text, images, graphic drawings and voice.

The three European firms will jointly define the bases of the system's architecture and will develop a group of products conforming to the specifications of this architecture. Moses will rest on workstation and processor networks integrating OSI/ISO communications standards. It will rely heavily on optical disk information storage technology.

The communications standards will be those adopted by the European group Spag. In addition to these standards, the Moses system will use the CCITT X.400 electronic mail standard and the new ODA standards defining the structure of multi-media documents encompassing texts, images, graphics and even voice annotations.

The three partners have established a system of "associated partners" whereby other firms seeking to develop hardware compatible with the Moses architecture will be able to obtain technical information on this architecture.

A Software Factory Project

A 1 year definition phase for the ESF (Eureka Software Factory) software engineering project was approved by the Eureka organization. The industrial partners are, for France, CAP Gemini Sogeti and Sema-Metra; for Sweden, Telelogic (subsidiary of the Swedish PTT) and for Germany, Nixdorf, AEG and Softlab.

This project corresponds do a 10 year program for a team of 100 to 200 persons. The definition phase will be conducted by a staff of no more than 25 persons, representing approximately 15 million francs for 1 year.

The objective of the ESF project is to raise the level of the concepts used in software engineering. The concept of the software "factory" envisioned by the project refers to the definition and standardization of high level concepts to enable, through a set of standardized interfaces, the exchange of software engineering tools and prefabricated software modules among workstations and systems.

Expansion to Data Bases

IN2 (France), a subsidiary of the Intertechnique group and Entel (Spain), a subsidiary of the Telefonica group, received Eureka's approval for their joint project. The purpose of this project is to study data bases and its objective is to extend them to voice and image, to structure and manage them through expert systems, to simplifty their use and to develop programs (for the programmer as well as the user) and their security of operation.

The budget for this 5-year project is 20 million ECU.

Logic Programming Project

Paris ELECTRONIQUE ACTUALITES in French 5 Sep 86 p 7

[Text] In the context of the Esprit project, the CRIL company was selected as the prime contractor for a project combining nine partners, with the objective of defining and implementing pre-industrial prototypes of logic programming environments.

It should be noted that CRIL has already worked on an Esprit project directed by SAGEM with the ojbective of studying and validating concepts and techniques that will be usable in future data base and knowledge management systems.

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WEST EUROPE/MICROELECTRONICS

ES2: INNOVATOR ON EUROPEAN IC MARKET

Paris ZERO UN INFORMATIQUE in French 28 Jul 86 p 4

[Article by Roland Dubois: "Design of Integrated Circuits--ES2, a European Company"; first paragraph is ZERO UN INFORMATIQUE introduction]

[Text] ES2 [European Silicon Structures) is a new semiconductor company, founded on an idea of Jean Luc Grand Clement, who was vice president and assistant general manager of Motorola Europe.

ES2 is not a semiconductor company in the traditional sense of the word, because its specialty is not mass production of integrated circuits. ES2 is a high technology company designed to meet market demand for prototypes and low-volume customized integrated circuits according to system-specific requirements.

Throughout the world, but particularly in Europe, systems manufacturers are faced with very serious problems: 80 percent of their hardware is produced in volumes of less than 5,000 units. For example, the production of bank terminals, military systems, and hardware for the industrial sector rarely exceeds 5,000 units. However, in order to meet installation deadlines for these new systems, the manufacturers need prototypes of real-time integrated circuits. Until now, several weeks (6 to 15) were required to obtain a prototype and, taking into account errors and modifications during the design stages, a usable product emerges only several months after research has begun. This time lag is often incompatible with the requirements of various modern industries.

"ES2's goal is to serve systems manufacturers in the data processing, military, space, and industrial sectors, as well as the general public, by reducing design turnaround time, thanks to the use of silicon compilation techniques, and by using circuit production techniques capable of producing prototype and low-volume with two weeks turnaround time," declared Jean-Luc Droitcourt, design director. He added: "ES2 will offer an unequaled service to manufacturers who need a short turnaround time for their prototypes and for the production of small quantities of customized circuits at a reasonable price."

Two Key Words: Silicon Compiler and Electron-Beam Machine

For design automation, ES2's strategy is to enter the market quickly by using existing tools for silicon compilation. Furthermore, ES2 has decided to invest in this field by developing the next generation of silicon

compilers. As for production, ES2 will write directly on silicon using electron beams, thereby ensuring shorter production times, lower costs for prototype manufacture, and low-volume production, thanks to the elimination of masks.

ES2 is taking a chance on the future by presupposing the viability of techniques for silicon compilation and for direct writing on silicon using electron beams. ES2 has decided to assign 80 people to the development of silicon compilers. It has secured the services of John Gray, the founder of Lattice Logic, a company which played a pioneering role in the silicon compiler field.

Systems manufacturers will increasingly take over circuit design. "ES2 will provide them with the training, silicon compilation software, support from the design department, prototypes with a short turnaround time and low-volume production," Jean-Luc Droitcourt declares. He adds: "We also guarantee compatibility with high-volume production lines."

Without a doubt, ES2's activities depend on training manufacturers and students who will arrive on the job market when all of ES2's planned silicon compilation tools are available. A significant effort is being initiated with acedemics.

ES2 is entering the European market for ASIC (Application Specific Integrated Circuits) in CMOS technology. According to Bernard Delapierre, marketing director for Southern Europe. "The ASIC market will grow from $210 million in 1985 to $676 million in 1988 and to $1,442 million in 1991. The market niche in which ES2 is situated (we do not produce logic arrays or gate arrays) is going to grow from $120 million in 1984 to $1.1 billion in 1991. Prototype and low-volume production , which is our market, will represent about 50 percent of the total market of which we intend to capture at least 20 percent."

An Entirely European Company

ES2 is legally incorporated in Luxembourg , its headquarters is in Munich and its business centers are in Munich, Paris, and London. Its development and automation center is located near London. One plant will be built at Le Rousset, near Aix-en-Provence, and by the end of this decade a second production line will become operational in the FRG or the UK.

ES2's funds are European (it has refused offers from American investors) and total $85 million. Six venture capital groups in Belgium, the UK, the FRG, France, the Netherlands, and Scandinavia have provided $4 million. The remainder comes from industrial partners, all European. Furthermore, long-term loans have brought in a total of $65 million.

ES2 has brought together a considerable number of European managers who have distinguished themselves in the semiconductor field. ES2 will employ about 300 people by the end of 1986 and 1,000 by 1991. In 5 years ES2's annual sales should excess $100 million.

25041/12781
CSO: 3698/A223

WEST EUROPE/MICROELECTRONICS

BRIEFS

ES2 PLANT CONSTRUCTION--European Silicon Structures (ES2) has just started construction of its French plant near Aix-en-Provence. An initiative of Jean-Luc Grand Clement, who was vice president at Motorola Europe, ES2 is in the business of manufacturing custom-made integrated circuits in record time: only 2 weeks instead of the 6 to 15 weeks normally required for production of small quantities. All the investors taking part in the ES2 project are European, such as Bull, Olivetti, Philips, and British Aerospace. ES2 will occupy premises of about 20,000 square meters near Aix-en-Provence, including 4,500 square meters in plant space divided into 1,700 square meters for silicon wafer production and clean rooms and 800 square meters for production support facilities (assembly and prototype testing). The ES2 team will move into the offices in April 1987; production of the integrated circuits will start in the summer. [Text] [Paris ZERO UN INFORMATIQUE in French 15 Sep 86 p 6] 25053/12781

CSO: 3698/A003

WEST EUROPE/SCIENTIFIC AND INDUSTRIAL POLICY

FRENCH SUPPORT TO DATA PROCESSING SECTOR EVALUATED

Paris L'USINE NOUVELLE in French 4 Sep 86 p 35

[Article signed A.P.: "Negative Conclusions in Brule's Report"; first paragraph is L'USINE NOUVELLE introduction]

[Text] Jean-Pierre Brule is harsh: The public system of aid to information technology is not working well.

Jean-Pierre Brule, Bull's chief executive officer until 1981, has just delivered his list of public organizations involved with the development of information technology to Alain Madelin, minister of industry, and to rene Monory, minister of national education. His report will pave the way for reform, the outlines of which will be revealed by Jacques Chirac on 15 September at the SICOB fair. Jean-Pierre Brule has already established four facts:

1. There are too many organizations. Nineteen have been registered but two of them have already disappeared (DAII [Directorate of Industrial and International Affairs] and New Technology Mission of National Education). In addition to DIELI [Directorate of Data Processing and Electronic Industries] of the Ministry of Industry, Jean-Pierre Brule studied INRIA [National Institute for Data Processing and Automation Research], the electronic sector, the CNET [National Telecommunications Studies Center], the CNRS [National Center for Scientific Research], CESTA [Study Center for Advanced technologies and Systems], and LETI [Laboratory for Electronics and Data Processing Technologies]. He also examined the Data Processing Agency [ADI], the World Information Center [CMI], ADEPA [Association for the Development of Automated Production], CESIA [Study Center of Information Systems of Public Administrations], Association X-2000, Urba 2000, CIIBA [Interministerial Committee for Data Processing and Office Automation in Public Administrations], Data Processing Mission, BNI [Office for Data Processing Standardization], and CEPIA [Center for Practical Studies on Data Processing and Automation].

2. The organizations aid mainly the public sector. "Nearly all the money is allocated to the public sector," says Jean-Pierre Brule, "while in the FRG private industry and small and medium-sized companies receive more government aid." In the FRG 35 percent of the Fr 2.5 billion in government aid is granted to small and medium-sized companies in the data processing sector.

3. Funds are not being funneled sufficiently to industry. Of the Fr 2.4 billion in government aid granted to the "nineteen" [organizations], too small a portion is earmarked for industrialization of products.

4. Some of these organizations changed their goals after completing their mission, notes Jean-Pierre Brule. But, has anyone ever seen public bodies committing hara-kiri?

these organizations will be reorganized. The time has come for dissolutions, mergers, and reorganizations.

25049/12781
CSO: 3698/A231

WEST EUROPE/SCIENTIFIC AND INDUSTRIAL POLICY

SWISS EUREKA PARTICIPATION

Paris ZERO UN INFORMATIQUE in French 8 Sep 86 p 96

[Unattributed article: "130 Projects Proposed: Switzerland Also Shouts EUREKA!"; first paragraph is ZERO UN INFORMATIQUE introduction]

[Text] Swiss companies are involved in several of the projects that have been adopted.

A report from the Federal Office of Science and Education indicates that of the 130 projects submitted by Switzerland in the EUREKA framework, almost 20 concern industrial automation, about 30 involve robotics, and 25 deal with sensors and micro- or optoelectronics.

Brown-Boveri [BBC] is the firm associated with the most projects. Several projects adopted on 1 July have Swiss participation (the Swiss Companies involved are in parentheses):

- Cosine European Research Network (Confederation);
- Flexible Manufacturing (SMH, Lasag, Microbo);
- Integrated Circuits (BBC);
- Mobile Security Robots (CSEM);
- Software Production Workshops (CIR);
- Paradi Automated Production Management (BBC);
- Freight Transportation Network (Transpotel);
- Prolog Tools (ETHZ [Federal Polytechnic University Zurich], BBC, Mettler);
- Integrated Sensors for Large-Scale Applications (CSEM, Valtronic, Cerberus);
- Computerized Engineering (EPFI [federal Polytechnic University Lausanne], Electrowatt, Ascop);
- Superconductive coils (Geneva University, Spectrospin, Promogap);
- High-Power Semiconductor Production (BBC, CSEM).

Diversified Interests

Interest was expressed for the Mithra mobile telesurveillance robots (EPFL, Cerberus), the destruction of chemicals by laser, and the production of gallium arsenide components.

The Swiss coordinators are C. Burckhardt, professor at EPFL (robotics); J. Ludewig, professor at EPFZ (data processing); and J. Harms, professor at the Geneva University (European research network).

Other useful addresses are: Federal Office of Science and Education (tel.: (031) 619-691), the DFEP Commission for Promotion of Scientific Research (tel.: (031) 612-146, and Vorort (tel.: (01) 221-2707 or 221-3808).

25048/12781
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WEST EUROPE/SCIENTIFIC AND INDUSTRIAL POLICY

BRIEFS

EUREKA IMAGE SYNTHESIS PROJECT--France and Luxembourg have begun subsidizing two European companies to install an image synthesis production center. The two firms, SESA [Automation Systems Study Company] (a CGE subsidiary) and RTL Production, have received $4.5 million from the two governments spread over 5 years. This sum will be used to buy three Iris stations from Silicon Graphics, a Ridge computer from Bull, and graphic software from Wavefront. The general idea behind the plan is to set up a European training and production center. For its part RTL will supply its video facilities, its artistic skills, and its contacts with future clients (TV for credit titles, commercials, etc.). Having already been involved in the CCETT [Common Center for Television and Telecommunications Studies] efforts, SESA will improve the American software by integrating certain additional features including the French AMAP software for the design of plant life. This center should be operational next March near the RTL facilities in Luxembourg. [Text] [Paris ZERO UN INFORMATIQUE in French 1 Sep 86 p 58] 25012/12781

CNRS RECRUITMENT IMPASSE CONTINUES--Suspension of researcher recruitment competition for 1986 is still causing ripples within the CNRS. Thirty of the eligible candidates met Thursday, September 18 in the Paris headquarters of the organization in an attempt to demonstrate their concern and obtain clarification of their fate. Their situation is not, in fact, very promising. Last 19 June, the research minister Alain Devaquet, who based his action on a State Council decision, suspended the work of the CNRS national committee (a consultative body), putting a halt to the recruitment process that was underway. Concerned that "young researchers not be penalized", Mr Devaquet proposed at that time that three-quarters of the 522 eligible candidtates be offered a one-year contract with the CNRS, until normal hiring procedures were resumed. The CNRS administration indicated that it would try to obtain various subsidies to employ the 25 percent who would not benefit from this temporary measure. In actual fact, according to the Candidates Collective, "the percentage of those excluded is 33, not 25 percent", (some 280 temporary contracts and 68 temporary reassignments were proposed). As for the subsidies, it added, "to our knowledge--and our members represent approximately half of the eligible candidates--the CNRS has not come forward with any solution." The proposed temporary measures appear to some to be a "big bluff" and they wonder whether these measures conceal a political willingness to reduce the number of CNRS researchers hired in 1986. [Text] [Paris LE MONDE in French 21/22 Sep 86 p 7] 9825

CSO: 3698/16

EAST EUROPE/BIOTECHNOLOGY

USE OF BIOTECHNOLOGY IN VETERINARY INSTITUTE

Neubrandenburg FREIE ERDE in German 10 Sep 86 p 3

[Article by Dr Steffen Agahd, Party Secretary and Veterinary Consultant; Dr Klaus Umlauft, Director of the Bezirk Institute for Veterinary Science: "Stimuli Resulting From Biotechnology, With Science and Common Sense Increasingly Lying on the Balance"; first three paragraphs are FREIE ERDE introduction]

[Text] * Bezirk Institute for Veterinary Science of Neubrandenburg--30 years of successful scientific cooperation--Domination of the latest biotechnical procedures by a community of young scientists--The science and technology plan this year presents 25 objectives--The top quality product from Neubrandenburg.

* Commitment to the 11th Party Congress honorably fulfilled--Viral diseases are not diagnosed biotechnologically--Responsibility as leading institute of the DDR for serological diagnostics--Research results are provided for veterinarians and farmers--Complex bezirk program is a stimulus for further achievements.

* Through the efficiency of the institute, 7 million blood tests have been processed for the eradication of bovine brucellosis--50,000 bacteriological investigations during the year for safeguarding the health of the general population--Recommendation for remodeling of over 200,000 animal lots during the last 5 years.

The Neubrandenburg District Institute for Veterinary Science was founded at this time 30 years ago. It was the first of its kind in the republic. Today, we employ 230 persons, of which more than 200 are women. Our animal hospital is well known for the treatment of domestic and farm animals of the bezirk residents both as outpatients and inpatients.

Our institute is the scientific center of veterinary medicine in our region. It assumes a high degree of responsibility for the diagnosis and control of animal epidemics.

The successful control of bovine brucellosis and tuberculosis proves what a closer relationship exists between animal health and performance. In 1976, 13

percent of the cattle stock was infected with brucellosis and tuberculosis (milk output 3245 kg/cow). In the current year, all stocks are free of these diseases (milk output 3800 kg/cow). The common efforts toward reduction of the animal losses led to higher breeding outputs. During 1981, 91.5 calves per 100 cows and 17.5 piglets per sow were raised in the region; in 1986, there have already been 100 calves and 20.5 piglets.

At the 10th meeting of the Central Committee of the SED in June 1985, Johannes Chemnitzer announced the following:

"The veterinarians in the District Institute are now diagnosing leucosis and brucellosis using biotechnological procedures. Next, they will also proceed to other viral diseases." We have kept our word and fulfilled our commitments for the 11th Party Congress. Encouraged by the district office of the SED, we have erected a modern enzyme-immunotechnical and laboratory. Thus, it is now possible to obtain a higher degree of diagnostic accuracy and automation. The results can be obtained much more quickly than was customary in the past.

As the leading GDR institute for serological, veterinary medical diagnostics, we operate closely with other scientific establishments. As a result of this fruitful collaboration, we were able to place a state-of-the-art automatic analyzer into operation this year. With this microelectronic apparatus, we are in the position to develop the enzyme-immunoassays (ELISA) further.

We are now faced with the task of opening up further possibilities for the detection of pathogens or antibodies by developing our own test instruments. In this case, we are following the international trend of using monoclonal antibodies in test systems for biological diagnostics. Such antibodies are obtained from cell cultures and are characterized by maximal purity and specificity.

Among other materials, fetal calf serum is used as substrate for their propagation. This product resulted from close cooperation between the institute, the VEB Rindermast Hohen Wangelin [cattle fattening]. The Waren meat processing operation, and the National Institute for Nutrients and Immunological Preparation of Berlin-Weissensee. This serum assumes a central position in medical research. A front-running product from the Neubrandenburg bezirk! An American monopoly has been broken by the production of this serum and important savings in foreign currency has been effected.

Our bezirk institute is the first of our nation to have at its disposal the possibilities for diagnosis of infections as presented here.

The science and technology plan for 1986 designated 25 problems. All university groups will be used for their solution. We are conducting training courses with foreign professionals within the scope of the export of non-material services. Veterinarians from the DPRK, the Mongolian People's Republic, Algeria and Egypt are participating in this program by working at the institute.

The wide dissemination of useful, scientific knowledge of veterinary medicine and agriculture is the responsibility of the institute. We perceive this as our specific contribution to the increase of the production of animal

products, the elevation of their quality and the improvement of the working and living conditions in animal production. This is our contribution to the solution of the main problem.

We have been approached particularly in this complex program for the dissemination of scientific-technical advancements within the bezirk. The program was an incentive for us to take on additional problems concerning the increase of the primary production. Within the scope of the cooperation of production and science, we are particularly supporting the intensification of beef production.

All our scientific projects are discussed in the basic party organization and are assumed under party control. Our collective celebrated its 30th anniversary with awareness of tradition and completely new criteria for mastering scientific-technical progress.

13271/9312
CSO: 2302/3

EAST EUROPE/CHEMICALS-PHARMACEUTICALS

PRODUCTS, PLANS OF GDR TECHNICAL GLASS COMBINE

East Berlin SILIKATECHNIK in German No 8, 1986 pp 255-256

[Interview with Dr Schmoeker, general manager of the VEB Kombinat Technisches Glas Ilmenau; date and place not specified]

[Text] In the past, the editorial staff of the trade magazine SILIKATTECHNIK has on special social occasions afforded general managers of glass and ceramics industry combines the opportunity, within the framework of interviews, of introducing the respective combine to its wide circle of readers at home and abroad.

The starting point for this interview with the general manager of VEB Kombinat Technisches Glas Ilmenau, Comrade Dr Schmoeker, were the policy-making resolutions during the 11th SED Party Congress as well as the passing of the guideline for the national economics plan for the period from 1986 to 1990.

[Question] Comrade, please introduce our readers to VEB Kombinat Technisches Glas Ilmenau.

[Answer] VEB Kombinat Technisches Glas is an industrial combine manufacturing capital goods with a share of consumer goods production of almost 17 percent in the overall product yield, 25 percent of which is being exported.

Approximately 40,000 products for almost any sector of the national economy are manufactured by a workforce of roughly 14,000 in our 12 combine operations. More than two-thirds of the products are supplies for such important branches of industry as electrical engineering/electronics, construction business, chemical industry as well as agriculture and food products, to name just a few.

The production spectrum ranges from specialty glass for the manufacture of microelectronic components, silica glass for semiconductor and lighting engineering, technical glass for the light-source industry, architectural glass, chemotechnical container glass, glass tubes, liquid thermometers and electrical thermometer probes all the way to domestic glassware, thermos containers and Christmas tree ornaments.

Originating from the scientific-technical and economical center within the combine, the parent plant VEB Werk fuer Technisches Glas in Ilmenau, we have organized the product-specific work beyond our operational borders into ten

profile lines. An independent profile line was also developed for internally-built efficiency devices. The obvious significance of this contribution to economic growth is thus supported by a controlled and concentrated production. By concentrating the scientific-technical potential on crucial points, with the efforts of product group technical committees, the appointment of profile line representatives, plus tight organization and management of the scientific-technical work we shall complete, in line with continued intensification, the necessary and far-reaching structural change in our product profile and in the methods, that is, the innovation process.

Thus we meet the challenge of ever more effectively supporting and accelerating the development of such base innovations and key technologies such as micro-electronics, robotics and sensor technology, biotechnology and refining chemistry with our supplies.

[Question] Which motives were the determining factor for establishing VEB Kombinat Technisches Glas Ilmenau?

[Answer] The establishment of VEB Kombinat Technisches Glas Ilmenau answered to the main concept of the party's economic policies, namely to constantly improve in meeting the demands of a sweeping intensification with the establishment of closed reproduction processes within strong economic units.

Not until the formation of a combine and the associated profiling and concentration of the forces of scientific potential, the controlled internal production of spare and wear parts, and the increased production of efficiency equipment was it possible for VEB Kombinat Technisches Glas Ilmenau to make the necessary transition to comprehensive intensification and to effectively employ the appropriate form of management and organization.

Since 1 January 1984, the demanding uniform management through the parent operation has also proven to be successful in our combine. But also such internal effects as the quality-determining supplies for profiles tubes, domestic glass, insulation products and architectural glass made possible the discovery of reserves and ensured universal awareness of responsibility for all combine operations.

Those are the results of the formation of a combine, without which we would not have been as successful in realizing the economic strategy of the party and would not have been up to the challenge of new and higher tasks.

[Question] How were the policy-making resolutions of the 11th SED Party Congress received by you and the workers in your combine?

[Answer] Primarily as an indication and obligation for continued improvement in quality of work and comprehensive awareness of responsibility for the big tasks of the future.

Even during the party congress the workers discussed additional efforts and commitments and, starting with the parent operation which led the call to competition after the party congress in the Suhl district, immediately took

up the challenge of new competitive goals. These competitive goals are the best proof of how the challenges of the 11 SED Party Congress had been perceived and how the glass workers view the economy as the main battlefield and with great responsibility dedicate themselves to the solution of future tasks in the technical glass industry.

With many spontaneous commitments immediately following the 11th SED Party Congress, the workers have expressed their attitude to breathe life into the resolutions, to finish each workday with their best performances and to let their wealth of ideas flow freely into an ever improved development of working procedures.

This movement toward commitment is not only characterized by quantity but most of all by a new quality which is reflected in a personal and responsible worker identification with their combine.

[Question] At the center of successful improvement of national economic problems will be the intensification of the production process during the coming years. In VEB Kombinat Technisches Glas Ilmenau, how are the rapid transition into actual practice and the use of key technologies, microelectronics and CAD/CAM workplaces realized?

[Answer] VEB Kombinat Technisches Glas Ilmenau has to fulfill a dual function here; first of all, we have with our supplies a direct influence on the level, quality and tempo of introducing key technologies into the national economy, and secondly, this high commitment also requires that we ourselves accelerate the introduction of key technologies to keep up the pace at all. We have therefore made the binding motto "key technologies for key technologies" the basis for our considerations in the development of our plans and competitive programs. We benefit from working with a long-term concept, constantly to be qualified, for the complex introduction of key technologies.

This includes, for example, process-control installations for entire production sectors and the erection of more than 350 independent CAD/CAM work stations within the perspective period of planning.

Working on party congress objectives, initial experience was gathered in this direction and essential foundations laid for continued activities with respect to a noticeably elevated level in the adoption of key technologies.

In this context, we consider to be extremely important the cooperation with colleges and trade schools and with the Academy of Sciences in the field of process engineering, the development of new silicate materials and the clarification of basic material and process-engineering correlations. This close relationship of basic and applied research leading to the transition into practice is the basis for our successes, with our collaboration with the Ilmenau Technical College showing a particularly positive development.

Another aspect as well plays a significant role with regard to scientific cooperation: there exist contractual regulations with the Ilmenau Technical College and the Engineering School for Technical Glass Processing covering

trade-related qualification of the staff of our combine, transfer of topics for research papers and the use of trainees and graduates.

[Question] What share in the realization of the resolutions of the 11th SED Party Congress for the period of the 1986-1990 5-Year Plan is held in your combine by the operational calls to action from the Chamber of Technology [KDT]?

[Answer] In this instance, we present the problem to our technical engineering staff and the socialistic engineering organization and anticipate the intelligentsia's assurance to make a concrete contribution, beyond the plan, toward the performance development by putting forth additional efforts in science and technologies.

The main direction of thrust can only be that possibly all of the scientists, technicians, engineers, innovators and efficiency experts tackle those problems which have as their objective the economic effect of the innovation process for products and technologies, the quality assurance, the constant optimization of our social working capabilities and, of course, the improvement of working and living conditions for our workers.

We are in complete agreement with the KDT call-to-action and in close consultation with the scientific section of KDT Glass and have anchored in our work plans and initiative measures the idea that nothing but peak performances on a wide scale and under comprehensive adoption of key technologies will create the necessary conditions.

After evaluating the KDT call-to-action, all of the operational sections have now submitted definite initiative plans which give those objectives priority status.

[Conclusion] Esteemed Comrade Dr Schmoeker, we thank you for this interesting and enlightening discussion and wish you and all of the workers at the VEB Kombinat Technisches Glas much success in meeting and exceeding all of the targeted parameters and additional commitments made.

13011/12859
CSO: 2302/4

EAST EUROPE/COMPUTERS

FRG COMMENTARY ON GDR CAD/CAM SYSTEMS

Bonn INFORMATIONEN in German No 16, 29 Aug 86 pp 19-21

["CAD/CAM Systems Should Improve Design and Production in the GDR"]

[Text] Industrial production in the GDR is currently being accelerated with the assistance of computer-based design and operation. For months there has rarely been a day when the newspapers, magazines, radio, and television did not report on the microelectronic CAD/CAM system, which has been designated a "key technology" for the GDR by the SED General Secretary Erich Honecker. Along with savings in time and material, CAD/CAM is supposed to provide a massive production increase. There are currently 16,000 operational CAD/CAM stations, some of which are still very crude. By 1990 that number if expected to be 85,000 to 90,000 machines on which approximately 500,000 employees are to be trained. There are to be four to seven "cadre" available for each workstation in order to fully utilize the machines in work shifts. This is because of their high initial cost.

At the 10th SED Party Congress in April, Erich Honecker said:

--"We expect greater effectiveness of the builders, the project engineers, technical engineers and technicians to come from the economical application of this modern technology. In addition to that we expect a more flexible and effective arrangement of the entire working process."

In the past months, the terms CAD (Computer Aided Design) and CAM (Computer Aided Manufacturing) have been used extensively in the East German media: CAD includes the computer-assisted development, design and construction of products, and CAM is computer-assisted manufacturing control and monitoring. In the CAD stage, indigenous computer models of items to be manufactured are created in the "man-machine dialogue." According to the MAERKISCHE VOLKSTIMME,

--"Characteristics of the design item such as sizes or geometric dimensions, or electrical or mechanical characteristics, are electronically transmitted, stored, and modified during the work "dialogue" (work session). The results of this model development are presented in pictorial form (either as video display or prints) and as data for the fabrication in the form of items summary lists, assembly plans, and directions. These are provided both in print

and on suitable media (diskettes, paper tapes). CAM uses the results of CAD in production and adds to the value of utilizing robot technology and assembly process monitoring."

PRESSE-INFORMATIONEN, published by the Council of Ministers, writes:

--"Previously, for example, the builder had to operate with pencil, drawing board, slide rule or calculator, and numberous references and design standards. Plans and tabulations were created with them and with a great deal of effort, and these plans became the foundation for all subsequent procedural steps leading to actual production. With the application of CAD/CAM equipment, the builder conducts a dialogue with the computer via the video terminal, and at the same time incorporates additional input-output devices such as automatic plotters (digitizers). With that, the job descriptions are changing for many employees. This timely method of building (CAD) provides the groundwork for automated, universal manufacturing process configurations leading to computer-aided direction of production (CAM)."

Instead of the originally indicated 28,000 workstations, by 1990 there should be nearly 90,000 of them. The deputy minister for science and technology, Guenter Zillmann, explained this increase by saying that product development and tooling times for manufacture should be reduced 50 to 70 percent, the work productivity of builders, project engineers, technical engineers, and technicians should increase by 500 percent and the development costs should be halved.

SED General Secretary Honecker stated at the 11th Party Congress that, according to preliminary estimates, the total application of CAD will put several billions of marks in motion, and the work of hundreds of thousands of people will become more productive by several times:

--"With that, a potential is reached of such wide-ranging effects, it can scarcely be evaluated."

The following have been identified as successful applications of CAD/CAM in the GDR by East German publications:

--In the Electronic Components Combine, it now only take 4 weeks to design and manufacture new components boards, as opposed to the previously required 20 weeks. Productivity was increased here by 340 percent;

--In the production of textile blankets, the new series was developed in 2 days thanks to CAD/CAM. Manually that used to take 6 weeks. Production has been increased by 50 percent;

--Design productivity at a highway, bridge, and building contractor in Halle has increased by over 80 percent with the development and introduction of CAD proposals for the conceptual design of low-profile apartment buildings, with modernization plans and with plans for the urban utility and street systems. With construction and structural analysis tasks the increase has been from 400 to 500 percent;

--At the Carl Zeiss Jena concern, the speed for the manufacturing process for high-performance optics has been considerably increased, and at the same time tight manufacturing tolerances are being reached. New developments now only take 3 to 4 months instead of over a year.

By the way, the first CAD workstation was installed at the Research Center of the Carl Zeiss Jena Combine, and was equipped with Soviet hardware. This "model workstation for microscope object lens development" enabled reduction in the work required for the manufacture of an object lens, down from 440 manhours to 120. This is possible because the formal manual work required to produce documentation such as drawings, quality and testing standards, and the items lists were all fully automated.

Problems With CAD/CAM Introduction

CAD/CAM brings along with it two problems for the GDR: although the GDR-built computers are by and large technically quite simple, the hardward industry must increase their production a previously unexpected amount in order to make deliveries of the demanded number of computers and accessories, including software (programs). PC 1716 personal computers with the 8-bit microprocessor (such as IBM PC's 8088) will be needed in large quantities for production run preparations and for simple tasks in the development sphere. Computer workstations with 16-bit microprocessors (such as the IBM PC AT's 80286) are increasingly required for scientific and technical tasks. Sixteen-bit machines have been predominant in the FRG for a long time, but they are still very rare in the GDR.

The second problem concerns the macjine operators. There are supposed to be 100,000 people able to work at a CAD/CAM workstation by the end of 1986. Since the combines cannot wait for future graduates from colleges and technical schools, they must implement fundamental and advanced training themselves. They are being supported by the Chamber of Technology and Urania, the Society for the Propagation of Scientific Knowledge.

The training programs are very broad in scope and depth. They range from 1-day seminars for "leadership cadre" to post-graduate study with a duration of 2 years. The advanced training available was significantly increased with the erection of a special CAD/CAM Consultation and Schooling Center at the "Carl Schorlemmer" Technical College of Leuna-Merseburg. Along with 1-day seminars for leadership and technical cadre, 1- and 2-week courses are offered for special computer applications.

The move to a CAD/CAM workstation will be tied with shiftwork for many professionals in the GDR. Whereas a workplace for a builder at a prime contractor used to cost about M2,000, between M200,000, and M1,000,000 must be spent for a computer-supported construction workplace. Equipment as expensive as CAD/CAM should therefore be used more than 43.5 hours, which is the previously normal work week. Saturdays and Sundays will be included, too.

The Free German Labor Union Federation publication GEWERKSCHAFTSLEBEN has already criticized the attitude and above all the temporizing of many professionals toward the new equipment:

--"More than a few people say 'deliver us the new equipment first and then we will deal with it.' To think that way means to lose time. Before the new equipment rolls into the delivery yard, the people who must use it must be prepared for it. The qualifications necessary for that demand certain things--above all, persuasion. This is especially true for those who have for years and decades performed exceptionally well at their conventional, but now changed, work places."

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CSO: 2302/1

EAST EUROPE/COMPUTERS

USE OF COMPUTERS IN COMPILATION OF POLISH STATISTICS

Microcomputer Production, Use

Warsaw WIADOMOSCI STATYSTYCNE in Polish No 4, Apr 86 pp 29-31

[Article by Tadeusz Gruzlewski, Andrzej Kobylinski: "The Domestic Microcomputer Market and Microinformation Needs of Enterprises"]

[Text] The purpose of this article is to describe the microcomputer equipment produced in Poland and enterprise-level data processing needs. Such needs typical of the majority of enterprises will be considered. An approach such as this appears to be especially fitting in the light of the report "Wstepna Diagnoza stanu informatyki w Polsce" [A Tentative Diagnosis of the Status of Data Processing in Poland], prepared by the Polish Cybernetic Society [4]. This study proposes development of the data processing applications associated with mass phenomena. There is no doubt that the great number of solutions (hardware, software, and organizational) permits the introduction of systems in a shorter time and at lower cost.

In order for this actually to come about, production of microcomputer equipment must be initiated on the proper scale. It is rather difficult to determine the volume of microcomputer production in Poland with accuracy, because of the highly fragmented potential (which is scattered among state enterprises, and not just those in the data processing sector, Polish emigre and foreign companies, and even plants operated by individual entrepreneurs).

Characteristics of Domestically Produced Microcomputers

The microcomputers produced in Poland may be divided into 3 classes [1]: simple 8-bit microcomputers, advanced 8-bit microcomputers, and 16-bit microcomputers.

The first of these groups is represented by such designs as the ZX 81, the Meritum I, and the Spectrum. They come equipped with up to 64 megabytes of RAM and use cassette tapes for external data storage. External storage of this type precludes the use of such microcomputers for data processing in enterprises. Occasional attempts have been made to use them for this purpose, but they cannot be regarded as the proper path of development. An additional cause of failure is the very scanty software based on the rudimentary operating system. In addition, in some instances even the

keyboard design (usually unergonomic and not very durable) has prevented professional use. Production of equipment of this type must nevertheless be intensively developed because of the enormous cognitive and educational value.

The computers in the next group make up by far the largest volume of the microcomputer equipment produced in Poland. Mention may be made of such designs as the Imp 85, MK 45, ELWRO series 500, PSPD 10, Meritum II, and ComPAN-8. They have RAM of up to 64 megabytes as standard equipment (sometimes with the possibility of expansion to 640 kilobytes), with external storage on floppy disks (generally holding up to 1 megabyte, and even 5 megabytes if the more recent hard disk drives are available). They generally operate under control of various versions of the CP/M operating system or others compatible with this system. This permits ready use of the vast library of software and assures compatibility of programs. Microcomputers of this type may be connected to other computers as intelligent terminals.

The parameters indicated above imply the potential applications of the equipment in this group. Very generally speaking, they are applications limited to small and medium-sized files that are not too intensively used. Typical examples are recording of financial accounting processes, preparation of data for calculation in mainframe computers, assistance in secretarial work, materials management (in small and possibly medium-sized enterprises), and automation of certain kinds of factory operations.

The last category of applications is currently represented, insofar as state-run enterprises are concerned, exclusively by the MERA 60 computer (and its modification the MERA 600). A certain number of microcomputers compatible with the IBM PC and IBM XT have also been installed by Polish emigre and foreign companies. State-run industry also has recently been making preparations for starting up production of equipment of this type (the following systems are involved: the Mevax--MERA 6000, Mazovia, and the ELWRO 800 family of single or multiple-processor computers, 8 or 16-bit or both). It should be noted, however, that the 8-bit equipment is not obsolete, and that the absence of production of 16-bit computers merely attests to a certain lag behind the Western countries. While at the beginning of the 1980's it was felt that the 16-bit equipment would supersede the 8-bit systems, we now find that the 8-bit microcomputer market is continuing to develop intensively.

The computers in the group in question are characterized by fairly great capabilities, up to 1 megabyte of RAM, external storage on floppy disks and hard disks of the Winchester type (with a standard capacity of 10 megabytes and with 30-megabyte units also available), and optional arithmetic coprocessor. They can be connected to other computers as intelligent terminals and may be interconnected to form a network. They are generally equipped with the MS DOS operating system (sometimes also with CPM-86). An extensive software library is available under this system, including, for example, data base management programs.

Examples of 16-bit microcomputer applications, in addition to those typical of 8-bit equipment, include materials management (in medium-sized and even large enterprises), automation of factory operations (such as engineering work), and production planning and modification.

Microcomputer Application Areas in an Enterprise

There are many areas of microcomputer applications in an enterprise, the most typical of which are production management, supervision, and control and computer-aided design.

This article will be confined to discussion of the first of these applications. Computer-based production supervision and control is marginal under current Polish conditions (13.7 percent of the operating time of computers, mostly ones imported from the convertible currency payment area, is used for this purpose [2]). Although computer-aided design occurs more often (18.9 percent of computer operating time), it does so only in a certain number of enterprises. We will accordingly concentrate on the management sphere (68.4 percent of computer operating time), which is very broadly conceived and includes financial calculations, materials management, plan preparation and monitoring, economic statistics and analysis, personnel management, management of fixed assets and tools, and auxiliary office work.

Financial calculations take up the bulk of computer operating time in management (more than 25 percent). We will discuss this topic area in considerable detail, in view of the universal occurrence of the calculations and the mass nature of the data processed. Another reason is that the Polish computer industry is possibly best prepared to produce equipment supporting financial accounting processes.

The programs performing the calculations are characterized by simple algorithms. They utilize relatively small data sets which can often be stored on floppy disks. The crucial problem is entry of data into the program.

The process of entering data into a computer is the main area in which errors occur that have a significant impact on the correctness of results. A suitable level of output data accuracy is required, depending on the functions which the system is to perform. Associated with this is the need for checking data during processing, with the verification varying in range and degree of detail. Verification of the data processed is no different from verification in data processing with a minicomputer or mainframe computer. The verification may be made by the user or by the microcomputer (by software verification). The two methods are most often used together. The best form is verification performed by an interactive process. Software verification is carried out by means of standard software or software written by the user or at his order. Beyond controlling the parameters, the user is unable to modify the range of verification performed with standard software.

The following three data entry checks [3] should be made before data from source documents is entered in machine storage media.

There are three alternative ways of making these checks.

First of all, there are checksums (which are described in the discussion of parity checks). Then come check digits, which are used for error detection in numerically written identifiers. An additional check digit is provided with every product. When a tag is entered into the computer, the supervisory routine calculates the check digit in accordance with the mandatory algorithm and compares it with the digit embedded in the tag that has been

entered. Lastly, there are error correction numbers, which are used in entering quantities between which known relationships exist. For example, the quantities may be reconciled horizontally and vertically, and equality of the sums indicates that the data have been entered correctly.

To conclude our discussion of data entry from source documents we must point out the following problem. The relatively low cost of microcomputers may lead to saturation of enterprises with this equipment. At the same time, the rising costs of traditional data media necessitates the generation of source documents directly on magnetic media. In view of the prevailing regulations, however, as well as the matter of monitoring, these media may be regarded as accounting records. The point is that it is relatively easy to make changes in the contents of files recorded on magnetic media (without leaving any traces).

It follows that financial calculations can easily be performed by use of advanced 8-bit microcomputers.

Problems of a somewhat different nature arise in materials management (which accounts for more than 19 percent of operating time in management), especially in medium-sized and large enterprises. Data bases must be maintained if materials of different kinds are involved, and the microcomputer must accordingly be equipped with hard disks of the Winchester type (with a total capacity of up to 60 megabytes). Inasmuch as processing amounts mostly to data base maintenance, there is no need for especially large RAM.

If users are dispersed, it may be advisable to set up a terminal network (e.g., a network of 8-bit computers). The next stage might be expansion of the data base by connecting several microcomputers equipped with Winchester hard disks (dispersed data bases).

Plan compilation (especially in large enterprises under economic reform conditions) might subsequently require the use of high-speed 16-bit microcomputers with large RAM. Calculations of the econometric and simulation types are often involved at this level. Data processing of this type requires relatively large computing capability.

We have presented three modes of operation in which microcomputers may be used. We now turn to brief discussion of the problems that may arise in connection with the use of microcomputers.

Microcomputers as intelligent terminals connected to a central computer. In this mode the microcomputer must be able to perform initial verification and any required initial processing of entered data, and also to convert data to the form required by the central computer. High computing power is not needed, inasmuch as the central computer performs calculations. The microcomputer must not necessarily (although it can and should) be equipped with a printer, because any printouts needed can be produced at the center. Entered data can be transferred directly to a central computer when the microcomputer is used as an intelligent terminal. A more convenient solution is recording entered data on local floppy disks or cassette tapes and then transferring the entire set of records to the central component of the system. Communication with the center is the most significant problem in this process. Special transmission links can be established if short distances

are involved; telephone or telegraph circuits must otherwise be used. The lag in development of the telephone network in Poland is well known. Permanent leasing of lines consequently represents a serious problem. The alternative solution, use of switching circuits, is not a viable solution under Polish conditions because of the high error rate, the great length of time taken to establish connections, and unpredictable disruptions of transmission. Special transmission circuits are free of these defects, but they are very costly. Leased circuits have a lower error rate than the switching ones and cost less than special circuits.

Microcomputers as devices for independent decentralized processing. The problem of the size of the data sets which may be stored in their entirety in available RAM arises when microcomputers are used for this purpose. The majority of the 8-bit computers made in Poland use floppy disks with a capacity of up to 1 megabyte (up to 5 megabyte with the latest disk drive versions). This is not much, and accordingly it is not possible to develop large systems. There are, however, many applications for which computers of this type are adequate (e.g., office automation). Whenever this mass storage capacity is insufficient, data files may be stored on Winchester hard disks with which 16-bit computers are equipped.

Microcomputer networks. Microcomputer networks may be divided into two categories, centrally controlled and dispersed. An example of the first category is a 16-bit computer equipped with a hard disk and 8-bit computers connected as intelligent terminals. This type of network does not differ in essence from the one described in the immediately preceeding paragraph. Another type is represented by a system of interconnected 16-bit microcomputers storing data in bulk on hard disks. This type is employed whenever a large number of local data bases available to a large number of users and dispersed data bases are maintained. Hybrid solutions combining features of both of these two systems are also possible.

Under the most general classification, two basic microcomputer applications may be distinguished. The first includes all new applications of digital equipment. The low cost of microcomputer capacity allows the use of computers in areas in which electronic digital equipment was not used in the past. We may mention motorization, medicine, telecommunications, education, robots, office automation, and many others. With the exception of robotics and office automation, this group of applications has little to do with data processing applications in enterprise management.

The other type of applications includes all the areas in which minicomputers, and even mainframes, have been used in the past. From the engineering viewpoint their replacement with microcomputers cannot be regarded as a breakthrough introducing a new quality into the data processing problem area. On the other hand, consideration of this topic makes sense if the economic context is taken into account.

The computing power of microcomputers, especially 16-bit computers, equals (and often exceeds) the capacity of a large part of the minicomputers used in Poland. On the other hand, they are far less expensive, and moreover the cost of equipment replacement is lowered by the possibility of incorporating into the microcomputer system peripherals (dot matrix printers) and mass storage devices, especially disk drives, already in service. This

is particularly important inasmuch as production of peripherals and auxiliary storage devices is a major problem under Polish conditions.

While printer production is gradually increasing, there is a shortage, for example, of modern keyboards (ergonomic ones with programmable function keys). The number of floppy disk drives manufactured is also too small (around 1800 in 1984). Winchester disk drives, on the other hand, will not be made in Poland over the next several years.

Once the economic and organizational aspects have been taken into account, among others the brief period required for preparation of small systems and their susceptibility to duplication, microcomputer equipment must be rated as highly suitable for use in enterprise management. Large-scale use of such equipment nevertheless requires action in the direction of substantial increase in 8-bit microcomputer production, start-up of 16-bit computer production at the earliest possible date, and increase, in some cases start-up, of production of peripherals and mass storage devices.

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Experiences, Development

Warsaw WIADOMOSCI STATYSTYCNE in Polish No 4, Apr 86 pp 33-34

[Article by Grzegorz M. Kacprzak, Industry Division, Central Office of Statistics: "Use of Microcomputers as Statisticians' Tools. Evaluation of Experience and Development Trends"]

[Text] A fundamental factor requiring change in the way the statistician has worked in the past is the growing demand for studies of an analytical as well as tabular nature. There is limited potential for satisfying these needs, because of the difficult personnel situation. The employment of highly skilled key personnel for routine computing operations is a disturbing phenomenon.

In theory statisticians have had and continue to have mainframe computers available to them (the ICL 1903, Odra 1305, ME 29), along with the microcomputers with which computer centers in the government statistical system are equipped. However, theis equipment has rarely been used in practice because of the large number of data processing systems, the lack of cohesion between systems, the forms of access, and the deadlines set for performing calculations. Another factor preventing direct use of mainframe computers is the general irreproducibility of studies resulting from ad hoc needs, along with ignorance of programming languages on the part of statisticians. It should be pointed out that for a number of years programming has been included in the curriculum of economic courses in which personnel are trained for statistics.

The existing software, both standard and that written at computer centers, does not allow independent use of computers by statisticians. The electronic centers are not equipped with enough peripherals, including terminals for work in a remote access system. Nor has a solution yet been found for the problem of data transmission between centers. Because of the current specialization in the area of the reports processed at individual electronic centers, this greatly impedes access to essential data needed in a short period of time.

Consequently, computers are in effect beyond the immediate grasp of statisticians. There is a prospect, however, of changing this situation. It can be done through development of microcomputerization. The use of professional microcomputers in the statistician's work requires both training of statisticians for work with this equipment, connecting microcomputers to mainframes, and adaptation and development of new systems permitting manipulation of data bases in accordance with user needs.

Since mid-1984, for more than a year, the Industry Division has been using the IMP-85 professional microcomputer, which is the equivalent of the MK-4501 made by MERA-KFAP. This 8-bit microcomputer with 64 kilobytes of RAM is equipped with a screen monitor and a single 8-inch floppy disk drive of the PL-D and DZM-180 type for single-density disks having a capacity of 256 kilobytes per side. The software includes an operating system compatible with IMP in BASIC and FORTRAN programming languages, an editor, a text editor, and utility programs. Software has recently been expanded by additon of the PASCAL programming language.

The work now being done with the microcomputer is related to the following problems: equalization of sales values based on length of work time for the needs of the monthly summary bulletin, calculation of the degree of progress in compilation of the Central Annual Plan (CPR), creation of data bases of the card file type referring to the volume of product output published in the monthly summary bulletin, and analysis of the efficiency of management of socialist-sector industry from 1980 to 1984.

On the basis of more than a year of microcomputer operation, it may be stated that the IMP-85 microcomputer as a central unit including monitor and keyboard is not highly reliable equipment for professional purposes. Over the period in question, the power supply unit was damaged, and there were also disk drive breakdowns. The disruptions of minicomputer operation were due chiefly to malfunctions of the head movement and drive mechanism. The longest

down time was 2 weeks. the quality of customer service provided by the IM POL firm unfortunately left much to be desired in some instances. The breakdowns which occurred after the warranty period had expired were eliminated by electronic technicians of the Statistical Operation Mechanization and Automation Division of the GUS [Central Office of Statistics].

The average down time did not exceed 1.5 hours counting from the time when a malfunction was reported. In the case of serious breakdowns, we were lent a disk drive unit from another microcomputer installed in the Statistical Operation Mechanization and Automation Division of the GUS. The unreliability of the disk drive unit greatly limits the use potential of the minicomputer as a tool for the statistician. According to the manufacturer, the permissible read-write error rate is once a month. It has been much worse than this in practice. Read-write errors occurred around 30 times recently during running of the programs using direct-access files. The recipient of processed data generally has no interest in difficulties of this kind. He must receive the data at a time convenient to him, and the time available for performing calculations is very short. The inference is that disk drive units of more modern mechanical and electronic design should be tested. The mass storage units should be the least trouble-prone microcomputer element.

Satisfying the data needs of customers generally requires both the processing of fairly large data files and the creation of pertinent files from ones already in existence. The microcomputer installed in the Industry Division of the GUS still has not been linked to the mainframes at the Electronic Center. Consequently, data have to be culled manually from tabulations made available by individual divisions. The latest accomplishment in this area is the creation of a file running to 190 kilobytes (120 standards across the entire sector for a period of 8 years) in 2 months. Most of the time was taken up in securing the corresponding data from the individual elements of the office, determination of the substantive range of these data, and, something difficult to excuse, of the errors as well. Some of the quantities collected in accountancy not only are not utilized, but are also wholly unverified. The microcomputer has in this case performed the function of an element requiring both consistency of substantive solutions and, something of high value, change in the attitude of personnel toward the data made available to us and increased responsibility for these data. This seems to us to follow both from a sense of loss of control over access to data and from elimination of participation by the persons previously administering these figures in preparation of analyses. Corrected figures have been submitted promptly.

The microcomputer as a working tool of the statistician must also be an intelligent terminal of a mainframe computer. As an integrated device, it must be equipped with a large memory. It is a relatively inexpensive device with which to secure permanent access to appropriate files, data subsets, by the mass storage of the computer. It is much more costly to expand the configuration of a mainframe by increasing both the RAM and the mass storage to the extent needed to guarantee access to any desired data file by all users at any given time.

The number of microcomputers in operation in the Office is so small as to significantly limit the range of application of equipment of this type. Microcomputers are currently installed only in a few WUS [Provincial Offices

of Statistics]. It is difficult for many potential users to gain access to the equipment. It is our assessment that every WUS should have 3 to 5 microcomputers installed in it, one of them connected to a mainframe computer. Hence, around 250 to 350 microcomputers should be installed in the Office.

Learning to program in BASIC by persons having no contact with data processing has presented no major problem. Organized training in BASIC programming has been administered to 17 persons. Some of the personnel began work with a microcomputer immediately after completing the course. The course should be repeated, with consideration given to classifying the students on the basis of their level of knowledge.

A factor impeding education of all trained personnel to work with a microcomputer is the difficulty of access to equipment, which is tied up performing work resulting from emergency needs or executing routine operations. The difficulties encountered by these persons should be eliminated and conditions should be created allowing them to make practical use of a microcomputer.

Another serious problem is retaining personnel who have already been trained. The low wages, the personnel policy mechanism currently in place, and the organization of work fail to guarantee personnel stability. In the last analysis, personnel characterized by high turnover are tantamount to no personnel at all. Unless the institutional conditions are modified to make work in the GUS more attractive, there can be no question of assuring continuity of operation, not just with the microcomputer but in individual elements of the GUS Office of Statistics and statistical agencies. The fact that BASIC programming can be taught in a relatively short time does not mean that the personnel trained will be able to ensure continuity of operations immediately.

It is essential to undertake immediately to determine the final model of the statistical agency employee, that is, his range of authority, decision making powers, and the technical equipment he needs. Return to the old methods of operation is now impossible in view of the importance of statistical information and the shorter periods allowed for compiling statistical studies. Introduction of microcomputerization at the previous pace leads to intensification of personnel problems and lack of progress in arriving at substantive solutions and compatibility of data ranges.

Progress is being made so fast in microcomputerization that this equipment should be introduced on a large scale from the very outset. Step-by-step introduction is in this case a factor impeding rational utilization. New technical breakthroughs make their appearance at intervals of 3 to 5 years, with resultant abrupt change in hardware and software oriented toward specific structures. There will be a predominance of 16-bit microcomputers in the next few years. We unfortunately cannot expect domestic production of these computers over the next 2 years to be high enough or that the GUS will be equipped with them. For the present and the next few years, the optimum model will be 8-bit microcomputers with extensive mass storage capacity, in the form of hard disks holding 10 to 30 megabytes.

The technology gap as it exists today is so large, insofar as use of microcomputers is concerned, that we cannot afford to let it widen further.

Organization of Statistics

Warsaw WIADOMOSCI STATYSTYCZNE in Polish No 4, Apr 86 pp 34-36

[Article by Stefan Malkus, Electronic Center, Central Office of Statistics: "Use of Mini and Microcomputers in Organizing Statistical Calculations"]

[Text] The economic reform and the elimination of the economic associations, has burdened government statistical agencies with heavier statistical accounting tasks. Accomplishment of these tasks requires adaptation of data processing technology to the new conditions and the finding of organizational and technological solutions.

Chiefly because of the uneven distribution and lack of uniformity of the computing equipment of statistical agencies, the previous method of performing statistical calculations leads to a relatively high proportion of manual, or mechanical plus manual, work counting from the time reports are received to compilation of output tables (about 80 percent of the time allocated for performing calculations); a relatively long calculation period, with no possibility of reducing it under the current organizational and technological conditions; and excessive use of postal services.

Proposed Organization of Data Processing

Execution of the computating tasks assigned to the statistical agencies to satisfy the needs both of the GUS, WUS, and enterprise founding units requires application of simple and effective data processing organization and technology. The technology should be based on the mini and microcomputers with which every provisional office of statistics and local elements of the provisional offices of statistics are equipped, computers located at regional centers and in the national center, and data transmission networks.

The fact that most provincial offices of statistics are equipped with MERA-9150 minicomputers, and that all provincial offices will ultimately be outfitted with them, justifies application of a technology different from that applied in the past. The basic computer equipment in the GUS network has been the ODRA-1305. The MERA-9150 minicomputers are auxiliary devices used chiefly for recording data and printing simple tables. Such organization of data processing as this is time-consuming and ineffective, inasmuch as the data files are forwarded (sent by mail) several times from the GUS data processing center to the electronic center and back for the purpose of verification, correction, processing, and set-up of the tables.

I recommend adoption of the MERA-9150 minicomputer as the basic equipment for preparation of the monthly and quarterly studies. The systems should accordingly be designed so that they may be run in their entirety on the MERA-9150. It is important for the operational supervisory routine to be uniform for this particular system, independently of the computers on which it is run. This situation should be different, on the other hand, in the case of annual accounting reports or of large-scale or one-time studies. The supervisory program should be divided into 2 stages, the supervisory range feasible on the MERA-9150 and other supervision performed by microcomputer.

The supervisory routine as thus developed should speed up the annual report preparation cycle, that is, it should greatly reduce the time needed for file purging and cut the number of postal shipments.

Division of reports into ones that can be processed in their entirety on the MERA-9150 and ones for which checking should be carried out in two stages, basic file purging on the MERA-9150 followed by supplementary microcomputer purging, should speed up completion of computing tasks.

Outfitting every WUS with MERA-9150 minicomputers and branch and local sections with microcomputers would allow development of a uniform equipment base at the provincial level.

Data transmission permitting total or partial reduction of postal service use is an important element in organization of statistical calculations, one contributing greatly toward reduction of computing time. Connection of the provincial data processing centers to the electronic centers and interconnection of the electronic centers by means of a data transmission network represent an important stage in the work of streamlining the organization of statistical calculations.

The computer centers assist the WUS in the area of full purging of files for annual reports and large-scale studies and in setting up and printing highly complex and detailed output tables. Communication between provincial centers and computer centers takes place in all centrally reconciled calculations.

The MERA-9150 minicomputers allow transmission of files to a microcomputer and back. They can be used in transmission of prepared and totally or partially purged machine storage media, and in transmission of error printouts or output tables from a microcomputer to the MERA-9150. The MERA-9150 minicomputers allow only data transmission without the possibility of participating in processing. This greatly restricts their use in the transmission system. Such restrictions do not apply, on the other hand, in use of the MK-4501 microcomputer. The MK-4501 can be used as an intelligent terminal for preparation of the floppy disk magnetic medium, arithmetic and parity checks, writing a file to computer memory, remote control of computer operation, introduction of corrections into a file written in computer memory, remote table processing and setup, and printing of draft and publication-quality tables.

A microcomputer capable of handling small files can fully replace the MERA-9150. The MERA-9150 and the MK-4501 microcomputer can work together closely with large files. The MERA-9150 can be used to prepare the machine storage medium, purge a file, and write all or part of a file to computer memory. The microcomputer in turn can be used for remote processing, full file purging, and setting up tables. Both types can be used to print draft and publication-quality tables.

This organization of statistical calculations at the provincial level can speed up considerably the processing of statistical reports.

The organization of statistical calculations at the provincial level can be organized in different ways, as determined by local conditions, the amount

of calculating equipment available, and personnel support. In the basic organizational version, all computing operations, from media preparation to printing of the output table, could be concentrated at the WUS data processing center, and all computing operations could be divided between the branch divisions and the data processing section.

In monitoring incoming reports with a microcomputer or the MERA-9150 minicomputer, branch division personnel enter the reports and check them. When all the reports have been checked, the file is forwarded to the data processing section. If there is need for additional verification operations, the personnel of the data processing system perform these operations with a computer in the data transmission system linked to their own electronic center, set up and print out tables for the needs of the WUS, and forward the purged file in the data transmission system to the computer center for execution of calculations for the country as a whole.

The local divisions are an important element in statistical calculations at the provincial level. Often situated a considerable distance from WUS headquarters, they collect reports in their area of operation and reduce the distance between the reporting unit and the WUS. If the local divisions were to be outfitted with microcomputers, reports could be checked and corrected in the division office itself and the machine storage medium could be prepared at the same time.

The effectiveness of organization of statistical calculations at the provincial level depends on a number of factors.

1. Computer adaptation of report forms

The report form must be reconciliatory in nature. The form must contain all the components of a particular sum. The specification "including" must be eliminated from the form. Form reorganization is essential, inasmuch as report verification, rather than file verification as occurs with the ODRA, must be applied because of the small memory capacity of mini and microcomputers.

The verification made with mini and microcomputers must be chiefly in the form of an arithmetic check. The arithmetic check must detect both errors made by the reporting unit in filling out a form and errors occurring when data are entered from a report into computer memory. Such verification can be made only if the form is reconciliatory in structure.

Parity checks, and in some cases comparison with the preceding report period, can also be made with mini and microcomputers. Verification is currently based on monitoring of logical functions and relationships, because of the large number of reports and the non-conciliatory form structure. Verification of this type requires larger computer memory and is made mostly with mainframe computers. There is a large volume of error report printouts. The majority of the errors are so-called recognition errors and generally go unchecked in the enormous volume of work. These errors greatly complicate operations at all verification levels, and their recognition yields no advantages at all. The supervisory services are unable to cite a case in which an error assigned to the recognition error category by a designer has been corrected by WUS personnel. On the other hand, there have been cases in which

errors that should have been eliminated in accordance with service requirements have been accepted by the WUS as correct.

2. The possibility of performing full computational verification on mini or microcomputers with forms reconciliatory in structure eliminates the need for the data collation widely employed today.

Collation is an anachronism in the computer age. Failure to adapt report forms for computer processing results in a heavy volume of manual work, which is very slow and error-prone and greatly limits the speed of statistical calculations and their quality.

3. Organization of Error Printouts

The computing systems currently adapted to computers, as pointed out earlier, involve large or very large error printouts which impede or prevent development of data transmission. In some systems the error printout, delivered to the printer by remote data transmission, takes 5 to 8 hours and only a few errors are corrected by the WUS.

Final Comments

The decentralized system of preparing computer-controlled data storage media by branch office statisticians during verification of reports results in considerable reduction of the time needed for preparation and purging of records.

The use of report forms adapted for computer processing, that is, forms which are reconciled internally, together with adaptation of processing technology to the capabilities of mini and microcomputers, simplifies and streamlines the computing system and allows introduction of efficient dispersed processing.

Adoption of electronic data transmission permits elimination of postal delivery of materials, with the resul that processing is greatly accelerated.

Printing provincial tables by equipment located at the WUS eliminates the forwarding of printouts from the electronic center to the WUS.

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EAST EUROPE/FACTORY AUTOMATION

APPLICATION OF ROBOTICS IN 'ELECTROMOTOR' ENTERPRISE

Bucharest REVISTA ECONOMICA in Romanian No 33, 15 Aug 86 pp 20-21

[Article by Dorin Gotia, director of the Timisoara Electromotor enterprise: "From Specialized Production Lines to Robotized Flexible Lines"]

[Text] At the Electromotor enterprise in Timisoara, the first year of the current five-year plan began with the mobilization of the entire collective into a transition to intensive production development, deeper involvement in the new technical-scientific revolution, and the achievement of a new quality of labor and life, as we are asked by Nicolae Ceausescu.

As part of the concern to improve the efficiency of economic activities, emphasis has been placed on greater labor productivity, an important resource for reducing the expenditure of live and materialized labor and for increasing material production. Particular support in this respect was received from the practical concrete measures for scientific organization and modernization of enterprises, production, and labor, established by the Executive Political Committee of the Central Committee of the RCP at the initiative of the secretary general of the party. In the spirit of the adopted criteria, a detailed program was formulated for greater increases in labor productivity so as to assure completion of the supplementary program for industrial production for 1986.

The ways and means used for this purpose are primarily aimed at an intensive utilization of the capacities of production facilities and of the labor force, closely correlated with encouragement of technological progress, better product quality, expanded product lines, and timely deliveries of electric motors for domestic and foreign customers. The action has also sought to improve indirect production and ancillary activities, among which the introduction of modern methods of product quality control, improved storage systems for raw and other materials, subassemblies, and finished products.

The concern for improved technical and quality levels is demonstrated by the fact that as early as this year, 75 percent of all products are of high international level, the remainder being at an intermediate international level.

A comparison between the specifications of the electric motors produced by Electromotor--efficiency, power factor, starting torque, reliability, weight--and those of motors produced by reputable foreign companies, illustrate the high performance of our products. The technical and operating specifications of our three-phase asynchronous motors (P_n = 30 kW at 1500 rpm) are comparable to those of AEG, Siemens, and GE motors; mining equipment motors are not worse than similar AEG and Siemens motors; single-phase resistance motors are comparable to those of such firms as Ajax and Hitachi; single-phase capacitance motors are competitive with those of Balador, Emerson, and Maraton; and so on. Starting with these achievements, the program to organize and modernize production processes is intended to provide the enterprise--at its present level of endowment--with a flexible structure that takes into account the constantly growing and diversified domestic needs, as well as the conditions of foreign markets.

A flexible manufacturing system necessarily incorporates automatic lines, industrial robots, and computers, combined into one organic unit adaptable to the requirements of modern production, which are to assure higher technical and operating quality, intensive utilization of fixed assets, reduced production, and especially material costs, and greater profitability. Adopting the new strategy, the party committee and the workers' council in the enterprise have started from several absolute premises, among which was the existence of specialized production lines with a high level of mechanization or semiautomation in the fabrication of electric motors. Some of these processes are sheet metal stamping, the fabrication of magnetic cores, axles, rotors, shells, and shields, coil winding, and so on, which in turn require hydraulic presses with automatic feed, automatic control lathes, multi-purpose machines, and other tooling to process parts and subassemblies widely used in production. Also considered was the requirement that a portion of the new equipment be produced through a cooperation--traditional by now--between production specialists and the staff of the Timisoara Polytechnic school.

Currently under construction in order to increase production mechanization and automation are a mechanized coil-winding line for 160-200-size motors, a line to process shells for the SU 3 model, with possibilities for expansion to SU 4, a mechanized coil-winding line for the REG motor, and so on. Other extremely important measures are directly aimed at production robotization, and with it, the achievement of programmed control for machine-tools using computer technology, and the introduction of microprocessors in production processes to control manufacturing, assembly, handling, and control systems.

An encouraging guideline for robotizing operations that require large amounts of manpower comes from the task outlined by Nicolae Ceausescu during his working visits at the enterprise. Consistent with it, multidisciplinary collectives have been created, whose activity receives the support of local party and state organs.

As a result of this activity, a robotized flexible production line is currently being implemented; it is designed for comprehensive processing of rotors for 160-200-size electric motors, spanning fabrication from semifinished product to complete subassembly. It consists of three separate cells

whose operation is correlated through a constant dialogue among the process computers in each cell, the whole line operating as a single machine.

Labor productivity is increased by 300 percent through robotization, making use of numeric control duplicating lathes, bore grinding machines, automatic compensation for grinding wheel wear, and active control of ground parts, to improve fabrication quality, and implicitly, the quality of the produced electric machinery.

Modern methods presently used for quality control at intermediate stages and on final products are statistical-mathematical, integral active control, and others, both on received materials and basic semi-fabricated parts (silica sheet metal, coil wires, steels, aluminum alloys, chemicals, and so on), and on finished products. The project to automate and add electronics to test stands for the final quality control of electric machinery, will be completed this year in the form of a computer aided automatic test stand for single phase motors, with plans to expand this method to 80-112-size motors, and ultimately to all test stands.

The scientific organization of production and labor by means of computer technology was used not only to improve the management of raw materials, semifinished products, distribution, and so on, but also to monitor daily performance in all production departments and collect a technological data base, as well as to introduce computer-aided design so as to considerably shorten the design-adoption cycle in updating and modernizing products. Telecommunications and remote data processing will be expanded in the immediate future with exceptional effects on rapid and timely decisions, programming numeric control machinery, vertical stores dispatching, and writing software for specialized robots.

The efficiency of the measures taken during the first half of 1986 is materialized in a relative economy of 112 workers, an additional production of 40 million lei, and a reduction of 10 million lei in material costs.

For the collective of the Electromotor enterprise, the fulfillment of the economic objectives established by the 13th Party Congress will represent the increasingly wide implementation of the newest advances of science and technology for reusing and modernizing existing production capabilities, and for modifying the manufacturing structure by adopting and expanding products which consume less materials and energy, that are built with new technologies, and that can better exploit material resources.

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EAST EUROPE/SCIENTIFIC AND INDUSTRIAL POLICY

OFFICIALS COMMENT ON POLISH S&T POLICY, DEVELOPMENTS

Theory Versus Practice

Warsaw PRZEGLAD TECHNICZNY in Polish No 34, 24 Aug 86 pp 8-9

[Interview with Prof Jerzy Kisilowski, director of the Bureau For Scientific and Technical Advancement of the Planning Commission of the Council of Ministers, conducted by Henryk Nakielski; date and place not given: "The Source of My Concerns"]

[Text] Henryk Nakielski interviews Prof Jerzy Kisilowski, director of the Bureau for Scientific and Technical Advancement of the Planning Commission of the Council of Ministers, about the plan, science, and progress.

[Question] Professor, the "Program for the Development of Science and Technology for 1986-1990," which is an attachment to the National Socio-economic Plan, outlines the areas on which research is to concentrate, and we see listed: electronics, automatics, robotics, biotechnology, etc., in a word: ambitiously. Follow Japan as one's mother. What are we counting on, that we will be able to match the best? Why are we making a frontal assault on the most populated fields?

[Answer] Whether we can make a better tape recorder than the Japanese is unimportant, but without developing electronics we will be able to do very little. Electronics occurs in nearly all fields of industry today, and, increasingly, it determines the quality of the products. We cannot turn our backs on electronics, biotechnology, automatics, robotics; we cannot capitulate willingly, for that would mean the end of development, the end of our membership in the civilized world. Already there are fields in which the main obstacle to transferring technology is not the lack of convertible currency but knowledge. Even if we could buy these technologies, we would be incapable of adapting them. So much for necessity, now concerning our chances. You see, we cannot assume that we have a chance in electronics. Solid-state physics is highly developed in Poland, the theoretical foundations for the technology, so-called active silicon were laid at the beginning of the 1970's. Unfortunately, we wasted this opportunity, we were not systematic, and we lacked foresight. In formulating the central research program, we reviewed our knowledge in the various fields of science, and I assure you that we do not have a chance. We have a very solid theoretical foundation for the

development of laser, optical-electronic technology, a high level of biological and chemical knowledge. Everything depends on whether we can use this knowledge, whether the hopes we have placed in these programs come to fruition.

[Question] Do you believe they will be achieved? Do you believe that strengthening the central management of science and technical advancement is a "step in the right direction?"

[Answer] At least, this is the dominant pattern we see in the world today. The development of science and technology is not a result of chance discoveries. Blind chance plays an ever smaller role in advancement; and planned, organized action--systematic penetration of selected problems, consciously working toward a goal that has known value--an ever increasing role. These results and especially the time frame in which they are achieved depend to a great degree on the resources and investments engaged. And since the technological race is accelerating, the impatience of those who finance the research and use the results is also increasing.

With increasing frequency, research resources are combined, investment concentrated in order to achieve the results more rapidly, to beat the opposition. The level of responsibility shifts, strategic decisions are made farther and farther from the scientist's laboratory. For example, the European Agency for Coordinating Scientific Research was founded in 1985 in order to coordinate research in 17 Western countries in the fields of robotics, biotechnology, and advanced computer systems, materials research for electronics, engines, ceramics, and modern methods of information transfer.

[Question] Do the changes in Poland's system for managing the development of science and technology more centrally also result from an "increase in the impatience of those who finance the research and use the results?"

[Answer] In Poland, society finances the research and uses its results. Do you think that it has become impatient with what is happening to technological progress?

[Question] Society did expect increasing the efficiency of the economic mechanisms and not increasing central management.

[Answer] These are not mutually exclusive. I was speaking of the overall trend visible in the world. In countries where the economic mechanisms work well, one can observe concentration of the investments in selected research areas and central management of research and development. We can, however, speak of differences in the degree of centralization. In Poland only half of the total investments in technical and economic advancement remain under the control of the factories, the other half is under the control of the so-called Central Fund for Technical and Economic Advancement. Central management in Poland remains greater because of the economic mechanisms

continuing failure to encourage sufficient innovation. The economy continues to resist innovation as the only partial use of the limited funds under the factories shows. We cannot wait; the world is leaving us behind. Thus, until the economic mechanisms change the economy's attitude toward technical change (which will certainly take some time yet given the serious disequilibrium at present, which restricts their effects), we must simply force technical change.

[Question] But surely, professor, the critical programs were central management of advancement.

[Answer] You see, if people were angels, there would be no differences. It would not even be necessary to create any programs. But that is not how things are, so we create programs. The people who implement them usually begin by searching for the easiest way to avoid completing the task.

This is what happened with the critical programs, which left ways out open. They included a whole range of research on problems formulated too broadly and in practice frequently the contractor appeared to have completed the research, presented the results and many calculations, but these were of little use. The central programs present the problems clearly, they are formulated precisely, the demands are formulated with equal precision. In the Central Program for Fundamental Research, the results must be developed so that in the next phase concrete technical problems can be solved. Using these results, the problems in the Central Research and Development Program assigned to appropriate research and development institutions will generate concrete technical products: machines, materials, technology. Only then will a final accounting be made. Next, if the results receive positive evaluations, they will be implemented. In the new system, we have introduced a new element, government commissions contracts out implementation of a given technology and absorbs the risk. As you see, this entire system is internally consistent, beginning with the fundamental research, to development, to implementation. Further the contractor's accounts are settled after each stage.

[Question] It is too bad that Sienkiewicz did use such an organized system in his work. He would have surely left a richer legacy, but seriously: Professor, you do believe in the strength of these plans, decisions, that if everything is well planned, ordered, money provided, then a hail of golden ideas, marvelous inventions will fall?

[Answer] I do believe there will not be any without plans, programs, money, equipment, etc. You mentioned Sienkiewicz. Creative writing differs from science and technology. Today in science and technology even a genius will accomplish little without equipment, without access to information, etc. I understand your doubts, and I myself am not free of them. The best equipment and organization will not help if the right minds are missing. Average scientists will not revolutionize science, and average engineers will not revolutionize technology. I constantly repeat in discussions with various groups that our intentions will succeed only if we create an effective

selection mechanism in science and technology. The present mechanism is faulty. A number of barriers, primarily psychological ones, restrict its effectiveness. We are egalitarian. All inequality spawns immediate resistance, both among the elites and the common people. Everyone remembers that the principle of socialism is equality. We less inclined to remember that under socialism there is a principle of payment according to work. Our stomachs are equal! In science and technology not stomachs but heads decide, and these vary. As long as the most gifted do not rise to the top, as long as we do not trust them, we will have poor working conditions, including financial ones, and we will accomplish very little. The next barrier is age. Around the world there 30-year-old Nobel Prize winners, in Poland a 40-year-old scientist is still a beginner. A young scientist is a suspect person; only white hair creates trust. Please check the list of individuals who have become members of the Polish Academy of Sciences during the last few years. All of them are well past 50. Finally, the last one is partly psychological since it results naturally from the rigidity of the organizational structures. Everywhere else in the world scientist work on a problem, but in Poland they work in an institute. There is no chance to create an ad hoc group of appropriate people brought from various centers, from various cities, without releasing them from their positions, without transferring them, without all these personnel actions to solve a problem, even for one in the Central Research and Development Program. There is no movement of personnel between the institutions of the Academy of Sciences, universities, industrial research facilities. Everything is frozen. Problems are solved by whoever just happens to be in a given institution and not by those qualified to solve it.

[Question] That's wishful thinking.

[Answer] This is not my conviction, it is our conviction here in the Planning Commission, and we intend to proceed in this manner with the problems that lie within our jurisdiction.

[Question] Professor, all this sounds fine. But for now the institutes are emptying, the scientists are selling carrots in order to live.

[Answer] I know. I also know that if we intend to double our investments in science and technology by 1990 that we will not use up the funds with our present levels of employment. If even half of these additional funds go to augmenting our research resources, wage increases, etc., we will have to hire new employees to effectively use the other half of the funds. This will be a problem given that during the current 5-year plan we will add a net of 350,000 workers. We must not only think about this but undertake corrective measures. There are a number of these future problems which we must consider now: investments for implementation of research results, for example. If we accept that every fifth zloty spent on research produces results, then of the 1.5 trillion zloty to be spent during the current 5-year plan, about 300 billion will produce investments. Some say that every well spent research zloty requires 10 zloty for implementation, while others say 8 zloty. Even if we adopt the smaller figure, we see that in order to implement present research, we will have to spend 2.4 trillion zloty on investments in the next period on implementation. And this is only for new discoveries. This is a large sum.

[Question] The shelf is still there. Speaking of new research and its results, what about old research which is lying on the shelf?

[Answer] The system for managing scientific and technical advancement has been modified in part to prevent research from lying on the shelf. Not every new technical innovation lying on the shelf is wasted. Nowhere in the world is everything from the laboratory put to use. No economy could withstand such a level of investment. Introducing the centralized program, the center reserves the right and takes responsibility for selecting research problems, coordinating them with the needs and plans of the economy. We can worry about where we will find the investment funds for implementing current research in the next 5 years. But we cannot leave them on the shelf with a clear conscience. As regards those already on the shelf, we will use them to test the usefulness of government commissions; the fund for promoting implementation has already begun to function. We are attempting to promote implementation in another way. In the Office of Scientific and Technical Advancement and Implementation we have adopted a new conception, creating small innovative enterprises to transmit new methods from their creators to industry or in the case of small production runs to undertake production themselves.

[Question] There is an enterprise, "Posteor," and as far as I know the results of its activity are mixed.

[Answer] "Posteor" functions as a contact between the inventor and industry. It disseminates new technical methods without forming its own production plant. On the other hand, the enterprises, about which I am speaking, would themselves produce or offer products, technology, etc., developed, tested, and prepared by themselves. If, for example, engineer X has an idea or a finished invention, he can enter into a partnership with a state, cooperative, or private enterprise and begin production. This assumes considerable elasticity in these firms' actions, simplification of the principles for creating them and for their operation, "a green light." As regards implementation in state enterprises, the Planning Commission has given its blessing and also money. Limitations, although they lie in the nature of the Commission, should not affect implementation. We want something to move to change for the better.

[Question] Professor, what is your greatest worry as director of the Bureau of Scientific and Technical Advancement of the Planning Commission?

[Answer] The basic source of my worry is that practice does not always match theory.

[Interviewer] Thank you for your comments.

Unutilized Funds, Other Problems

Warsaw PRZEGLAD TECHNICZNY in Polish No 34, 24 Aug 86 pp 11-13

[Interview with Aleksander Zasada, director of the Department of Planning and Coordination of the Office of Scientific and Technical Advancement and Implementation by Wojciech Wiktorowski; date and place not given: "And What Next?"]

[Text] Wojciech Wiktorowski talks with Aleksander Zasada, director of the Department of Planning and Coordination of the Office of Scientific and Technical Advancement and Implementation.

[Question] Let's begin by recalling what the fund for technical advancement is.

[Answer] The fund for technical and economic advancement receives payments from the enterprises. The amount is determined by a percentage of the value of production sold. Half of this money constitutes the so-called Central Fund for Technical and Economic Advancement; half remains with the factories to finance modernization and, generally, technical advancement. The enterprises themselves decide how this money is used, whether for financing their research and development resources or for cooperation with specialized scientific institutions.

[Question] We hear with increasing frequency that the funds left with the factories are not well used. Do the enterprises not need these funds?

[Answer] In 1985 the value of unused funds for technical advancement exceeded 70 billion zloty.

[Question] A mind boggling sum!

[Answer] But we should not exaggerate. The statistics distort the picture. If we divide the 70 billion by the several thousand enterprises the final figure is very low, embarrassingly low, when we take into account the opportunities for their use.

[Question] These same statistics also show that, for example, the enterprises under the Ministry of Metallurgy and the Machine Building Industry failed to use more than 28 billion zloty. But subsidies for various enterprises exceeded 4 billion zloty. Is this also a statistical distortion?

[Answer] These types of data show primarily that the funds are poorly distributed. Enterprises with large values of production sold have huge sume in their blocked accounts for technical advancement. Others with lesser values of production sold but with greater needs (electronics, for example) drained their accounts before the second quarter passed. This shows the mechanism has problems.

[Question] Interesting,what happens with the unused funds? Do they just accumulate in the accounts?

[Answer] No, things are not that bad. These funds are frequently used as working funds. After the final audit, during the beginning of January, they are withdrawn and put to use, for example, to purchase raw materials. At the end of the year they are redeposited in the account. In this way credits from the National Bank of Poland are not required, which, as you know, carry a percentage rate of 12 percent. Can you imagine how much one can gain having a large advancement fund?

[Question] So much that it cannot help technical advancement. How can we prevent such practices?

[Answer] We could introduce special accounting procedures. But that would be nonsensical. We need to interest the enterprises in spending these funds. Perhaps it is good that there is a barrier imposed from above that the profits, for example, from a new experimental production installation must exceed 12 percent. Otherwise, it is more profitable to use these funds as interest-free credits.

[Question] Let's return to the use of these funds. Why have such large sums remained in the accounts?

[Answer] There was no desire to implement anything and there was nothing to implement. At least that is my opinion. I hold to the thesis that what our scientists offered was not so marvelous that it paid the enterprises to create the disorder associated with new investments and new production.

[Question] A certain professor told me that soon a quarter century will have passed since his institute gave the intrate plants in Tarnow a large volume of documentation on the production of silicon. At the time it was a marvel. It ended however "as usual," with the purchase of a foreign license.

[Answer] What you say suggests at once that science had a marvelous invention and that horrible old industry did not want to use it. Very well, how do you explain, that the enterprises fight for every license, every machine, from the West?

[Question] Cynics say they want the trips abroad.

[Answer] Yes, and they can go without this. Something else is involved. Simply, what science offers is of embarrassingly low quality.

This is mostly paper work, without plans, without adaptation of the technology to the given enterprise. This is world-class technology inasmuch as it comes from foreign catalogs. When they take it to the design office, at once there are cries that massive funds for imports of machinery are necessary. Take any report on the number of licenses sold by Poland abroad. Supposedly

our industry is not receptive. Then why do the institutes not organize symposiums, invite industrialists from other countries, not offer anyone else their inventions. Somehow nothing comes of this and nothing is sold. It is only a common stereotype that science has marvelous inventions, and Polish industry is so dull minded that it does not want to implement it.

Table. Resources For Financing Research and Development in 1985

	Billion zloty	Percent
Budgeted Resources under "Science"	31.3	21.8
Budgeted Resources of Universities for Research	c. 3.2	2.2
Payments to the Central Fund for Technical and Economic Advancement	105.9	73.6
Enterprise Development Funds and Working Funds	3.5	2.4
Total	143.9	100.0

[Question] I can cite other examples. Scientists from a certain institute attempted for 15 years to convince industry to use their ideas. To no avail. Only when a Polonia firm appeared did it turn out that mass production could begin in 6 months, and exports, a few months later to not just anywhere, but to Japan.

[Answer] In spite of everything, I stand by my statement that the greatest barrier remains science's complete separation from the economy's technological level. Without forcing science to abandon great intentions and goals and come down to the country's level, without beginning from small, necessary improvements, we will never achieve anything. In this 5-year period, we are to produce 5,000 new products and technologies. Only when we have taken care of this, will we be able to consider more ambitious plans.

[Question] In a word: science is guilty of everything. Are only the overly ambitious plans of our scientists the reason why funds for technical advancement remain unused?

[Answer] That is not what I said. I will always oppose scientists attempting to place all of the responsibility for implementation on industry. I believe the producer is primarily responsible for the marketing, or in the case of selling research results, the appropriate institute.

[Question] An unusual view.

[Answer] Not so. This is the way it has been in the West for a long time. Sales costs are 40 percent of the research costs. I, on the other hand, receive a 400 page listing of research work awaiting implementation.

It comes to the Office, to the Council of Ministers. What are we to do? Open a store selling research work? Nonsense! The institute itself can sell research work most easily.

[Question] Then the institute is to open a store for selling research work?

[Answer] It would be worth hiring a few people to call on enterprises, conclude contracts, demonstrate achievements. As yet there is no decent catalog. I ask: how is the director of an enterprise to know that something new is available, that he can modernize a given production line. He would have to show great initiative to travel through Poland and search for new ideas. Why not reverse it; why not encourage the institutes to make an effort, too?

[Boxed item: "The balance of the unused funds increased from 46.9 billion zloty at the beginning of the year to 72.6 billion by the end of the year, by 54.8 percent. This is incomprehensible if we take into account that many enterprises are complaining of a shortage of funds for technical advancement and demanding additional financing from central funds. Particularly disturbing is that the unused funds are concentrated in ministries whose products are carriers of technical innovation throughout the entire economy, for example: Ministry of Metallurgy and the Machine Building Industry, 28.9 billion zloty; Ministry of the Chemical and Light Industry, 18.9 billion zloty; Ministry of Mining and Power, 4.6 billion zloty; Ministry of Construction and the Building Materials Industry, 6.0 billion zloty; Ministry of Agriculture and Food Industry, 4.1 billion zloty." (Materials of the Office of Scientific and Technical Advancement and Implementation prepared for the presidium of the Committee on Scientific and Technical Advancement 15 May 1986)]

[Question] As far as I can remember, the creators of the reform foresaw that the enterprises were to show great initiative and send people throughout Poland to search for new ideas?

[Answer] But should only the enterprises do so? I repeat: In the West sales costs are 40 percent of the research costs. There one really has to work to sell an idea. You have to publish catalogs, organize symposia. I am proposing the same thing. This is reform: no one graciously does anything for anyone, nothing just falls from the sky, the government will not bail anyone out. Each independent unit must take care of its own existence. The institutes are independent units. They will earn more, have more money for equipment and salaries for employees, when the begin to sell their work. Is this not reform?

[Question] For now everything indicates that the enterprises are not interested in advancement. They do not want to buy this work and nothing will come of your plans.

[Answer] At the beginning of the 1980's it was generally believed that the economy would be replaced almost completely by market forces leading almost automatically to absorption of innovations. The experiment lasted for 3 years. The results are known. Nothing improved. We cannot wait for the market any longer. Obviously, the most healthy system relies on the enterprises contracting work to science centers and then implementing it. But for now such absorption of innovation is not occurring. We must begin forcing it. This is what the central programs, government commissions with various adjustments and preferences are to do.

[Question] But let's return to the unused funds for technical advancement.

[Answer] But that is what I am talking about! We want to commit at least a portion of the funds in various ways. For example, we can tell the enterprise that we will provide 80 percent of the funds needed to finance a given research project, and it will provide the remaining 20 percent from its own funds. In this way within the central resources, the 70 billion will be committed.

[Question] Thus, government commissions are the only way out?

[Answer] There is also a central fund for aiding implementation. Those who lack the funds for implementation receive an appropriate subsidy. And if someone decides to implement something he also decides to use the funds for technical advancement. This is a normal combined sale. We simply make it possible. We are counting on the situation improving significantly after the introduction of the new rules for setting the rates for the funds. In the coming year they will be set not within each ministry but within each branch. This will eliminate absurdities such as electronics enterprises in the metallurgy ministry having significant payments, while the same type of enterprises in the chemical ministry is unable to make ends meet. We will establish higher rates for enterprises in electronics, where the need for research is the greatest. Mining or metallurgy will have lower ones and will depend more on central program funds.

[Question] The idea of rigidly set obligatory payment rates has been roundly criticized many times.

[Answer] We ourselves stated that it is nonsense from the point of view of the reform. We wanted to abandon it. Let each enterprise deduct as much as it needs. But this met with sharp protests from the engineers in the enterprises. They claimed, quite correctly it appears, that when an enterprise must meet a cost formula and not an efficiency one, in order to raise the employee's fund, it will first cut all the technical advancement funds. Then there will be no funds for advancement. Rigidly set rates are obviously an artificial measure, but they are required by the economic situation. We will abandon this method when it is possible.

[Question] Are other changes in the way the funds are created foreseen?

[Answer] Yes. Until now half of the deducted funds were from central sources. Thus, if we wanted to increase the funds for central programs, government programs, or critical programs, we had to increase the payment rates. We could increase the portion of central funds to 70 percent, say, but then we would encounter strong resistance by the enterprises and the reformers. We went another direction. The payment rates will be reduced, but the entire fund will remain with the enterprises. On the other hand, funds for the center will be collected through taxes. This will be a fee to say 0.5 percent of the value of the production sold. In this way the two systems will be distinguished--funds for the center and funds for the enterprises. Obviously, if we notice that innovation comes to life and the enterprises lack funds, then in the individual annual plans we will increase the payment rates, thus increasing the funds available to the enterprises.

[Question] Finally, a fairly important problem: who is paying for everything? From whose pocket are the funds for advancement coming? Are the enterprises covering these costs?

[Answer] As long as the formula of increased production costs forcing enterprises to increase profits remains binding in economics, then technical advancement and the funds for it will be a two-edged sword. This fund de facto does not cost the enterprise anything, only the customers, because it adds to production costs. When costs increase, prices can be raised. These simply provide additional funds.

[Question] And despite the fact that they are additional funds, enterprise directors ignore them and say that production continues, sales are not bad, and pay no attention to technical advancement. Why?

[Answer] I can you send to the Planning Commission for the answer. I mean that seriously. Our bosses everywhere, whenever possible, exclaim that there will be no miracles in science until there are miracles in the national economy. For now, not miracles but a touch of reality, real prices in the economy, would suffice. As long as these do not exist, all calculations have to be based on costs and there cannot be any efficiency accounting. The claim that we can introduce reform, market forces, technical advancement without solving the price issue is ridiculous. A total fiction.

[Interviewer] Thank you for your comments.

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EAST EUROPE/SCIENTIFIC AND INDUSTRIAL POLICY

REGULATIONS ON GDR SCIENTIFIC, INDUSTRIAL SECTOR COOPERATION

East Berlin FERTIGUNGSTECHNIK UND BETRIEB in German No 9, 1986 pp 562-564

[Article by Prof P. Freund, Dr sc jur, Chanber of Technology, Otto von Guericke Magdeburg Technical College: "On New Research Collaboration Regulations Between the Industrial and Scientific Sectors"]

[Text] 0. Introduction

There exists at the universities and colleges of the GDR as well as at the institutions of the Academy of Sciences (AdW) a considerable research potential which must be exploited, to a greater degree than has been the case in the past, to accelerate the development rate of productive forces. Reacting to respective demands at the 10th Plenum of the SED Central Committee (Footnote 1), there now exists concrete legislation (Footnote 2) constituting the basis for creating mutually advantageous relations among the combines on the one hand, and the institutions of the AdW and the college systems on the other hand. Some of the key points of the legal work in this area shall be detailed below.

1. Bases for Research

It must be stressed that the new legislation is not intended to bring about a change in the status of the previously mentioned institutions. They will remain institutions charged predominantly with performing basic and applied research. They must not be pressured into the role of subordinate R&D units for the combines.

The retention of their assigned responsibilities is evident in the fact, among others, that research at the Academy and at the colleges is performed on two different bases:

--on the basis of economic contracts with combines

--on the basis of research contracts by the secretary for colleges and vocational schools or the college chancellors or president of the Academy, respectively.

In the case of research efforts based on orders as per item 2, the industrial application of the targeted results is not yet forseeable, something that is

to be expected, however, with the results of research as per item 1. To delineate the research, these assignments are called "assignments of controlled basic and applied research." In the future they are to be processed on a contractual basis. The results obtained must be made available to the combines in an applicable form.

Concentrating upon basic and applied research does not preclude, however, that the research work at the Academy and in colleges be given a greater rank among the requirements of economic and technical-technological development of the combines. This can only be the result of long-term and close collaboration among the parties involved. It cannot be replaced by administrative decisions.

2. Contractual Organization of Cooperation

The research ordnance is largely concerned with the contractual organizations of collaboration. For one, the research ordnance includes the option of signing coordination agreements (§ 9) and of performance agreements (§§ 10 ff) for another.

Both agreements are closely related.

2.1. Coordination Agreement

Primarily, the purpose of the coordination agreement is the long-term organization of a research collaboration between a combine and a college or an AdW institution, respectively. Consequently, complicated decisions must precede the signing of such a contract. Especially important is the agreement among partners on the main areas of research cooperation. This concerns strategic decisions which place high demands upon both sides. As a rule, optimum results cannot be achieved unless there exists genuine technical communication among the partners and this decisionmaking process is largely free from subjective influence. The requirements of the legal provisions will only be met by the partners if they succeed in establishing "common objectives and responsibilities of strategic character ..." (Footnote 3) and clearly define these.

The long-term organization of research cooperation includes other measures which should be agreed upon in a coordination contract. The § 9 research ordnance contains related orientation examples which the partners must develop in various ways depending on the existing specific conditions. For example, the partners should stipulate in the coordination contract measures as to the material-technical safeguard of research, the joint assembly and exploitation of test and pilot plants, the exchange and qualification of staff, among others. In the long term, these stipulations can significantly affect the results of the research effort.

An agreement is also necessary on measures which indicate the status held by a university or college as a place of higher education for students. Therefore, the coordination contracts must also contain stipulations on practical courses for students, the inclusion of students in youth research collectives, the

allocation of topics for students' finals exams and the like. With such measures, which serve to involve college students in research work, it is possible to quite considerably expand the potential of a university and to familiarize students, at an early stage, with the requirements of actual practice. The character of the coordination agreement as an instrument for the long-term development of the research cooperation also infers that the commitments resulting from these contracts must be taken into consideration by the partners when formulating the plans.

The development of a joint research strategy and its reconciliation in a coordination contract are significant conditions for the organization of an effective research cooperation. However, they are only the preliminaries to collaboration, since a coordination agreement by nature does not yet stipulate performance relationships, but merely prepares these, as a rule.

2.2 Performance Contract

The development of performance relations takes place by entering a performance contract (contract for scientific-technical services). This contract then is geared to the realization of the tasks which initially had been agreed upon in principle in the coordination contracts and beyond that have become an integral part of the plans developed by the participants. It applies for the performance contract as well that it is the partners' own responsibility to interpret the contents of the contract taking into consideration in each case the existing specific circumstances. The legal provisions (compare especially § 10 research ordnance can be no more than a guide in this respect. Much of the evidence, which in the final analysis constitutes the contents of a performance contract, can only be found in the success of penetration into the technical specifications. To this extent, the make-up of such a contract is both a legal and scientific task. This particular feature for planning contracts covering scientific-technical services is also being accommodated by requiring that specs be prepared for these tasks (Footnote 4), which become an integral part of the contract. In these instances the specs are not only a specific instrument for governing the scientific-technical effort, but also a means for precisely defining contractual agreements.

Furthermore, one has to make sure that the specification of objectives and problems in the specs must be a joint decision by the partners. Here too it is apparent that research collaboration results in demanding requirements as to the contents for both sides.

It is to be assumed that the results sought with research cooperation are of high merit and thus open up special possibilities of legal protection. To this extent, the partners must also agree on patent right work in these performance contracts. The projected individual activities must be based on a common strategy of patent rights policy (§ 13 research ordnance committing the partners to close cooperation in the acquisition, preservation and defense of patent rights.

Although the institutions of the AdW and the universities are considered to be the source operations in the intendment of patent law and thus are responsible themselves for the protection of their results, in actual practice it has proven to be beneficial if patents are applied for jointly with the combine. It is found that in these cases the inventive solutions are being used more quickly.

Ambiguities arise repeatedly with regard to stipulations to be made on the participation of the AdW institutions and universities in the utilization or transfer of the research results achieved by them. As a rule, the participation of the originator of a scientific-technical result in its transfer will increase its effectiveness. The temporary separation of the researcher from the facility might, however, jeopardize other assignments usually worked in parallel.

It must be emphasized that neither party benefits if these obvious difficulties are circumvented with vague contract formulations which do not lead to any commitments. A solution that is satisfactory for both sides cannot be achieved unless all aspects of cooperation are being viewed in their complex meaning and effect. This suggests, for example, utilization of previously mentioned agreements on a staff exchange for transfer services as well. The same holds true for measures regarding material-technical protection of research, but also for qualifying personnel.

2.3 Price Agreements

Agreements with regard to price play a particular role in each performance contract. This also applies to performance contracts entered between the combines and the institutions of the AdW as well as the universities.

One must keep in mind that the realization of revenues has not changed anything in the status of the institutions as a budget organization. The AdW institutions and universities use the income to replace public budget funds previously appropriated for specific purposes.

More consistently than before, pricing is geared toward replacing the actual social expenditure. It is now possible to calculate a contribution for social funds as well as write-offs (§ 18 Section 2 research ordnance). In addition, the regulations for pricing procedure make it possible to have a controlled influence on achieving a certain level or adhering to deadlines. This is achieved primarily by agreeing on a normative or increased research allowance, respectively.

The normative research allowance is linked to compliance with

--economical goals (national economics orientations),

--objectives and parameters for the scientific-technological level to be achieved,

--time frames for the solution of a research problem,

all of which are stipulated in the specs or the economic contract (§ 18 Section 6 research ordnance).

For peak level research results, an increased research allowance can be agreed upon. The increase may amount to up to 100 percent of the normative research allowance. The final amount of the research allowance will be determined in the result of the financial statement justification. The § 19 Section 3 research ordnance governs principles which are a mandatory basis for such a decision.

While the research allowance provides a stimulus primarily for the establishment where research is taking place, the research ordnance contains further options of financial stimulation, which mainly address themselves to the collective of researchers. Of special significance is the arrangement of problem-related performance allowances (§ 26 research ordnance). This concerns a form of performance-oriented salary structure intended as an incentive for high creative achievements on the part of the researcher. Therefore, it becomes necessary to specify individual performance and effectiveness objectives. They must be derived from the specs or the economic contract.

3. Exploitation of Research Results

Furthermore, for the legal work in the area of research cooperation, the objective contained in the research ordnance is significant, namely to submit to the combines on a contractual basis for exploitation for a valuable consideration the research results already available at the institutions of the AdW and the university system. This also promotes closer collaboration and effects a greater compliance--on the part of the AdW institutions and universities--with the combines' economical and technical-technological conditions, for such contracts are not likely to be signed unless the proposed research results meet the requirements of the technopolicies of the combines. The provisions of the research ordnance (§§ 11, 20) exclusively apply to the planning of these relations. The instructions of Section V of the "Order for the application of economical accounting in research and development" (Footnote 5), which are considered to be a special ruling for the issuance of scientific-technical results for exploitation for a valuable consideration, consequently do not apply for the relations between the AdW institutions as well as the universities and the combines.

The contract covering the distribution of scientific-technical results for exploitation for a valuable consideration is not only intended to submit to the other partner the result for exploitation. Rather, § 20 research ordnance outlines the framework for the calculation of the exploitation renumeration to be agreed upon. When agreeing upon the exploitation renumeration, the partners shall take into account the agreed scope of exploitation, the economic benefit to be expected at the combine, the level of the scientific-technical result, the expenditures incurred in connection with obtaining the result, as well as the guaranteed parameters. Consequently, these criteria are merely

starting points, but not the basis for calculations. The research ordnance leaves partners a sufficient margin for negotiations. Upper limit for the exploitation renumeration is the expenditure which was necessary to arrive at the results.

FOOTNOTES

1. Honecker, E., "In Preparation for 11th Party Congress of the SED. Speech given at the 10th Central Committee Meeting of the SED." Berlin: Dietz Verlag 1985, p 32.

2. "Resolution Covering Principles for the Planning of Economic Relations of Industrial Combines With Institutions of the AdW and of the University System, dated 12 Sep 1985," GBl.I 1986 No. 2.

   "Ordnance Covering the Management, Planning and Financing of Research at the AdW of the GDR and at Universities and Colleges, Especially of Research Cooperation With the Combines" - Research Ordnance - dated 12 Dec 1985, GBl.I 1986 No. 2.

3. Hoche, F.; Klar, R., "The New Standards for Research Cooperation Between the Combines and Institutions of the AdW of the GDR and of the University System," WIRTSCHAFTSRECHT, Berlin (1986) 2, p 35.

4. According to § 1 of the 1st DB to Specs Ordnance (dated 11/23/1983, GBl.I No. 36), Specs must also be prepared for assignments of basic and applied research, insofar as they are for the purpose of direct preparation of scientific-technical efforts for the development of products, processes or technologies.

5. Order for the Application of Economical Accounting in Research and Development, dated 11/23/1983, DBl.I No. 36.

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